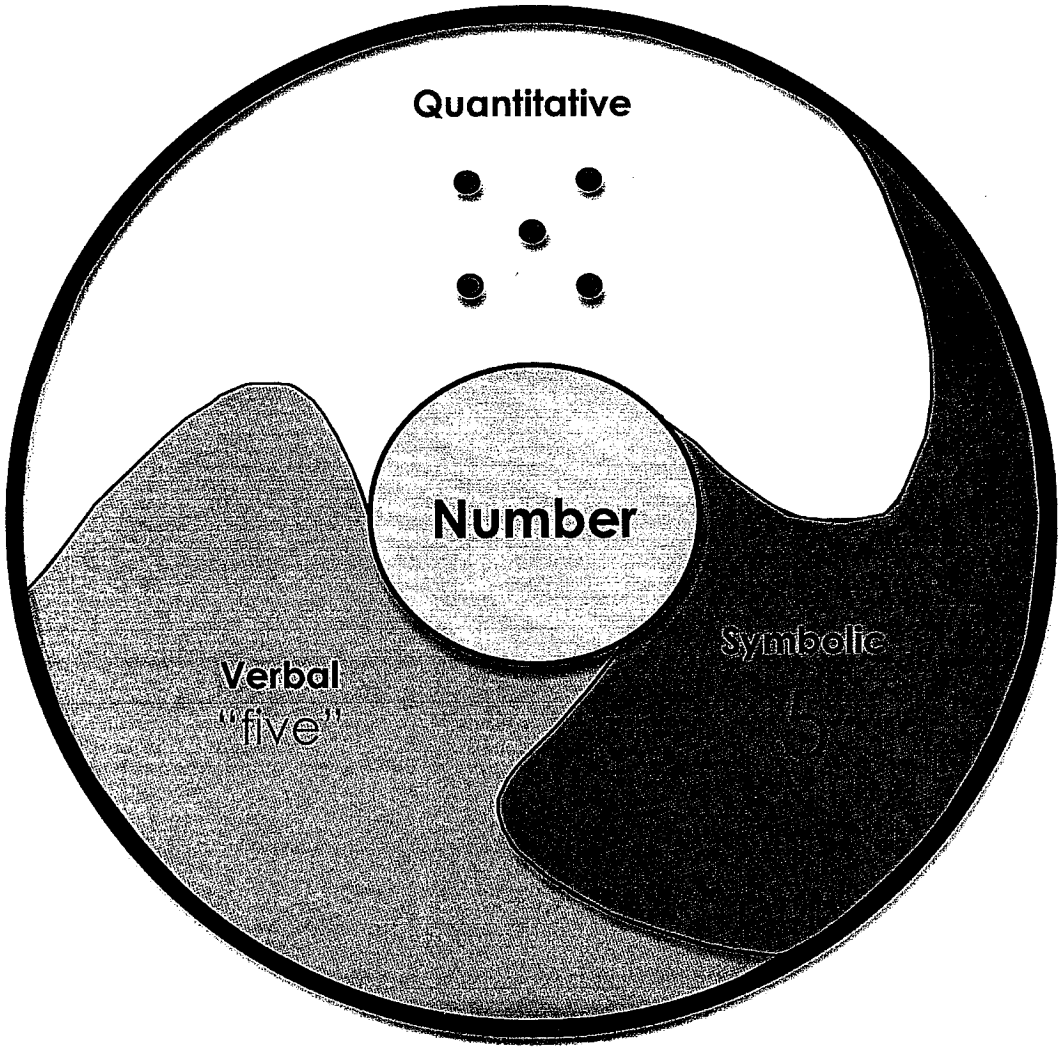
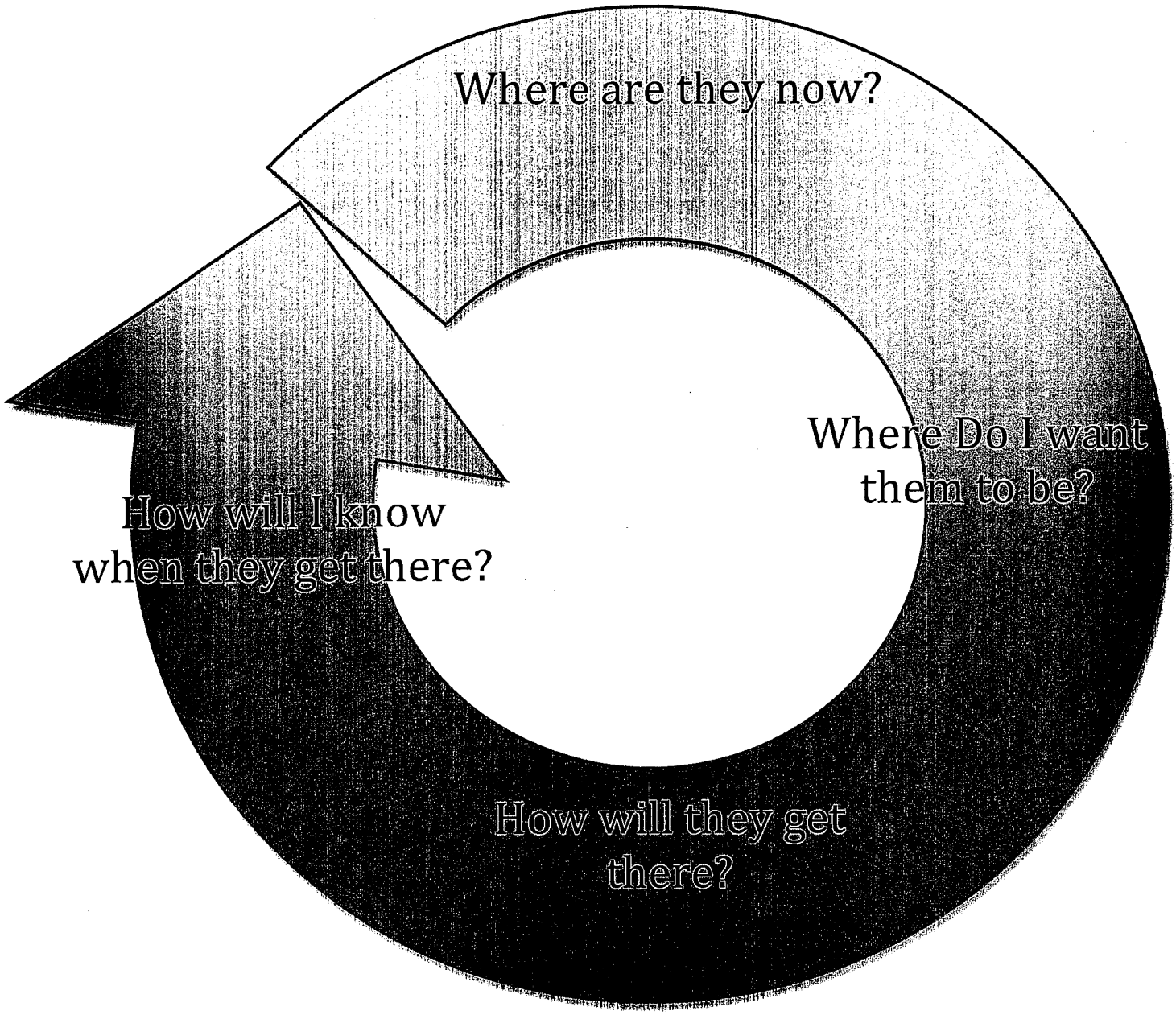
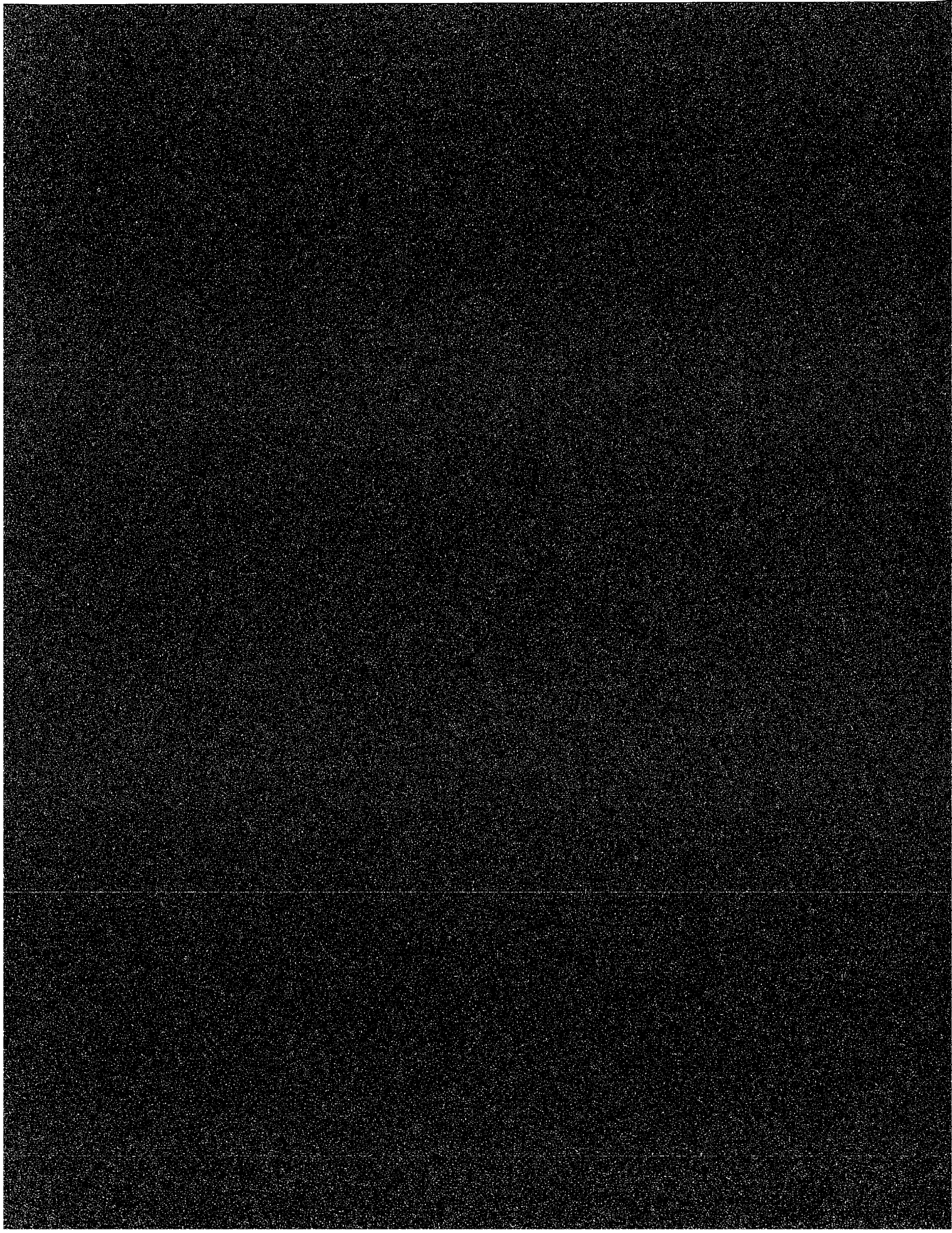
Building Number Sense with Fluency

(Non "count by one" Strategies)

The 3 Aspects of number



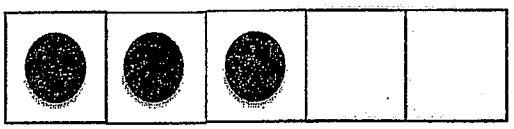

Where are they now?
Where Do I want them to be?
How will I know when they get there?
How will they get there?



Math Recovery
Combining and Partitioning Sequence
Related to the Levels for Structuring Numbers

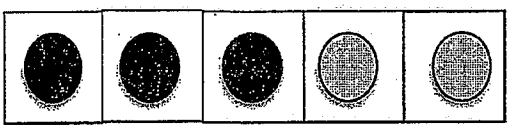
LEVEL 1 – Facile Structures to Five

Combinations to 5



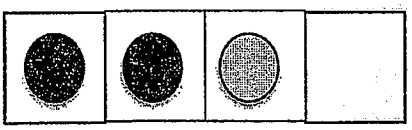
How many dots?
How many more to make five?

Partitions of 5



How many dots?
How many are black?
How many are grey?

Sample related task:

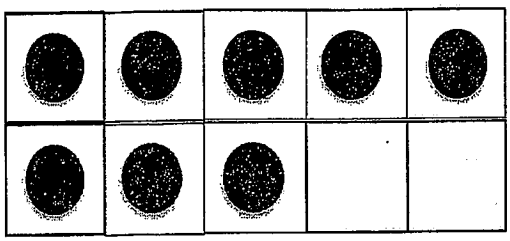


How many black dots?
How many grey dots
How many altogether?

Other questions (with or without materials):
What goes with 1 to make 5?
Tell me 2 numbers that make 5?
How many is 5 take away 2?
How many is 1 and 3 more?

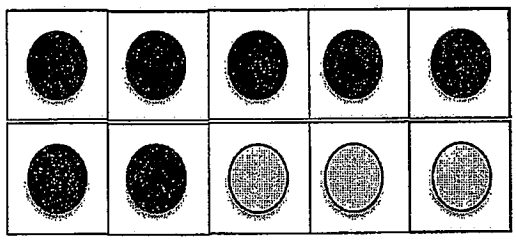
LEVEL 3 – Facile Structures to Ten

Combinations to 10



How many dots?
How many more to make 10?

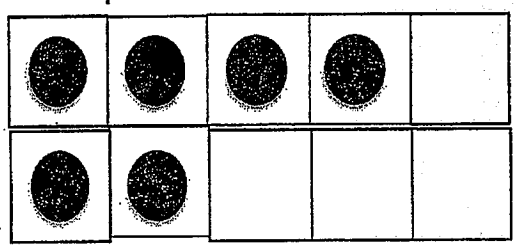
Partitions of 10



How many dots?
How many are black?
How many are grey?

Note: Frames with a full 5 and those with more dots in general are typically easier than those starting with a small quantity.
Commutativity may not evident (e.g. 8 + ___ = 10 is easy, 2 + __ = 10 is difficult.

Sample related task:



Complete:

If it was 5 on top it would be _____ but it is only _____ so I take _____ off. It is _____.

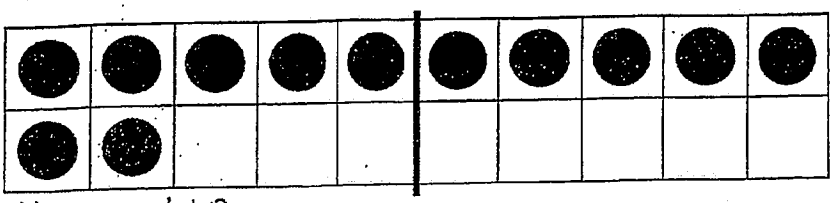
Examples of possible solution strategies:

a. Compensation – If it was 5 on top it would be 7, but it is only 4, so take 1 off, it is 5.
b. Transformation (five-wise) – take 1 from the 2 and put it with the 4 to make 5, that leave 1, 5 and 1 is 6.
c. Transformation (pair-wise) – take 1 from the 4 and put it with the 2, that makes 3 and 3, that's 6.
d. Take 1 from the ____ put it with the _____ to make 5.
e. Take 1 from the ____ put it with the _____ that makes doubles.

Other questions (with or without materials):
What goes with 6 to make 10?
Tell me 2 numbers that make 10?
How many is 10 take away 3?
How many is 6 and 2 more?

LEVEL 5 – Facile Structures to Twenty

Combinations and Partitions to 20
(using reference numbers of 10, 5, and doubles)

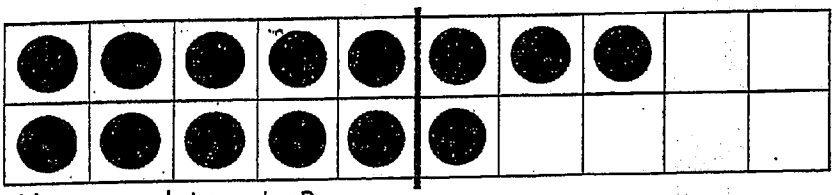


How many dots?
How many more to make 20?

(Also, tasks involving partitioning a full 20)

Note: Frames with a full 10 and those with more dots in general are typically easier than those starting with a small quantity.
Commutativity may not evident (e.g. 17 + ___ = 20 is easy, 3 + ___ = 20 is difficult)

Sample related task:

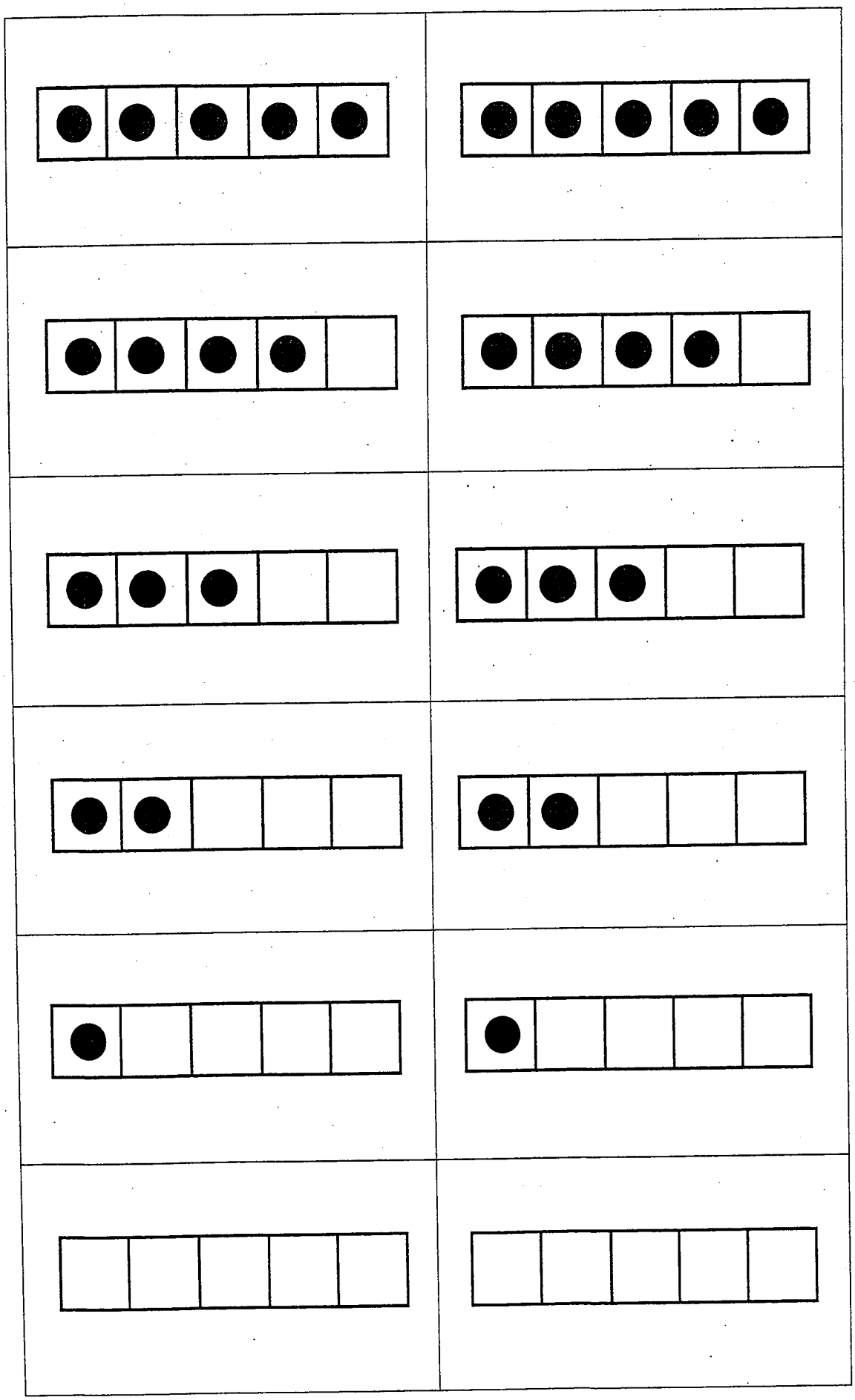


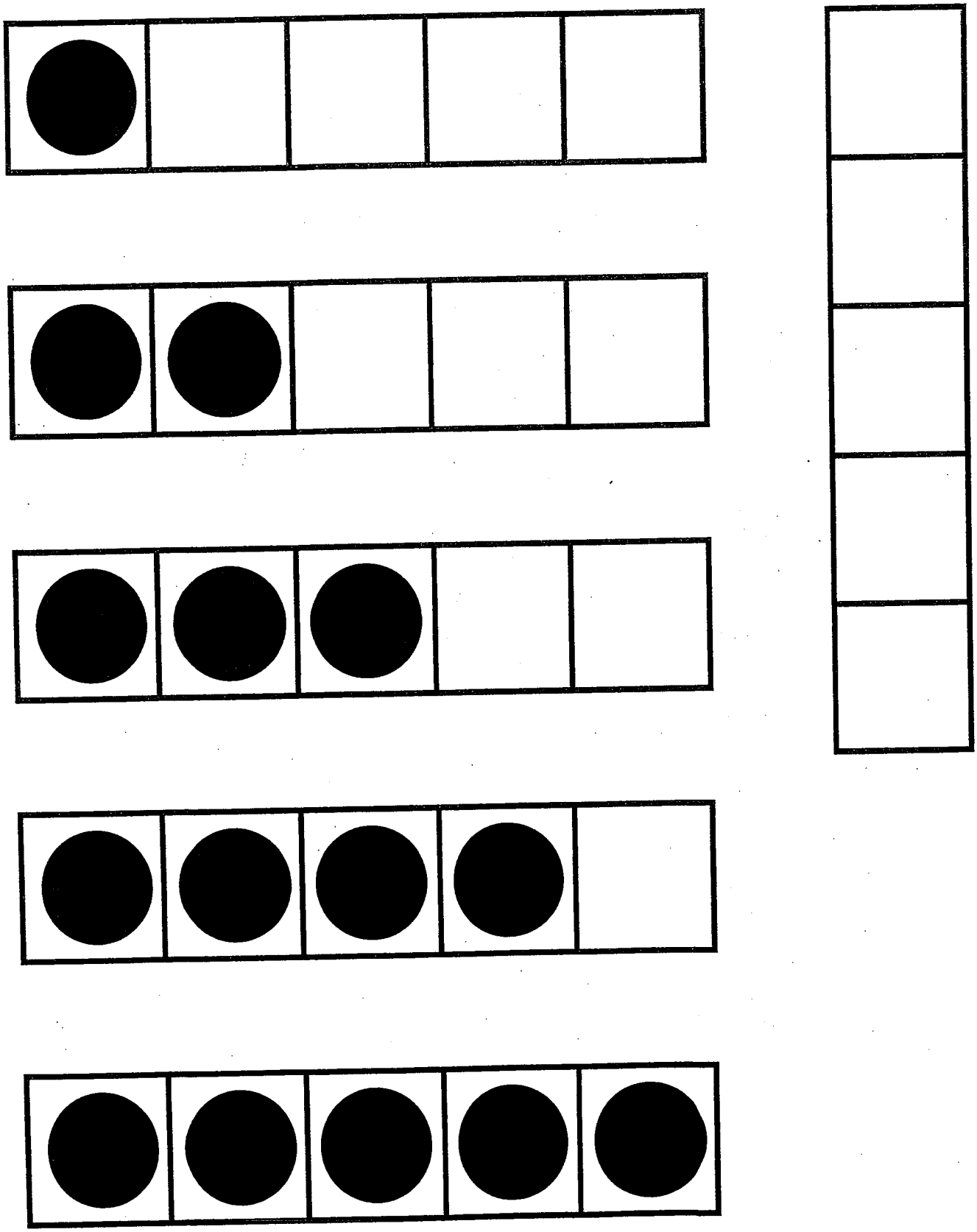
How many dots on top?
How many dots on bottom?
How many dots altogether?

Examples of possible solution strategies:

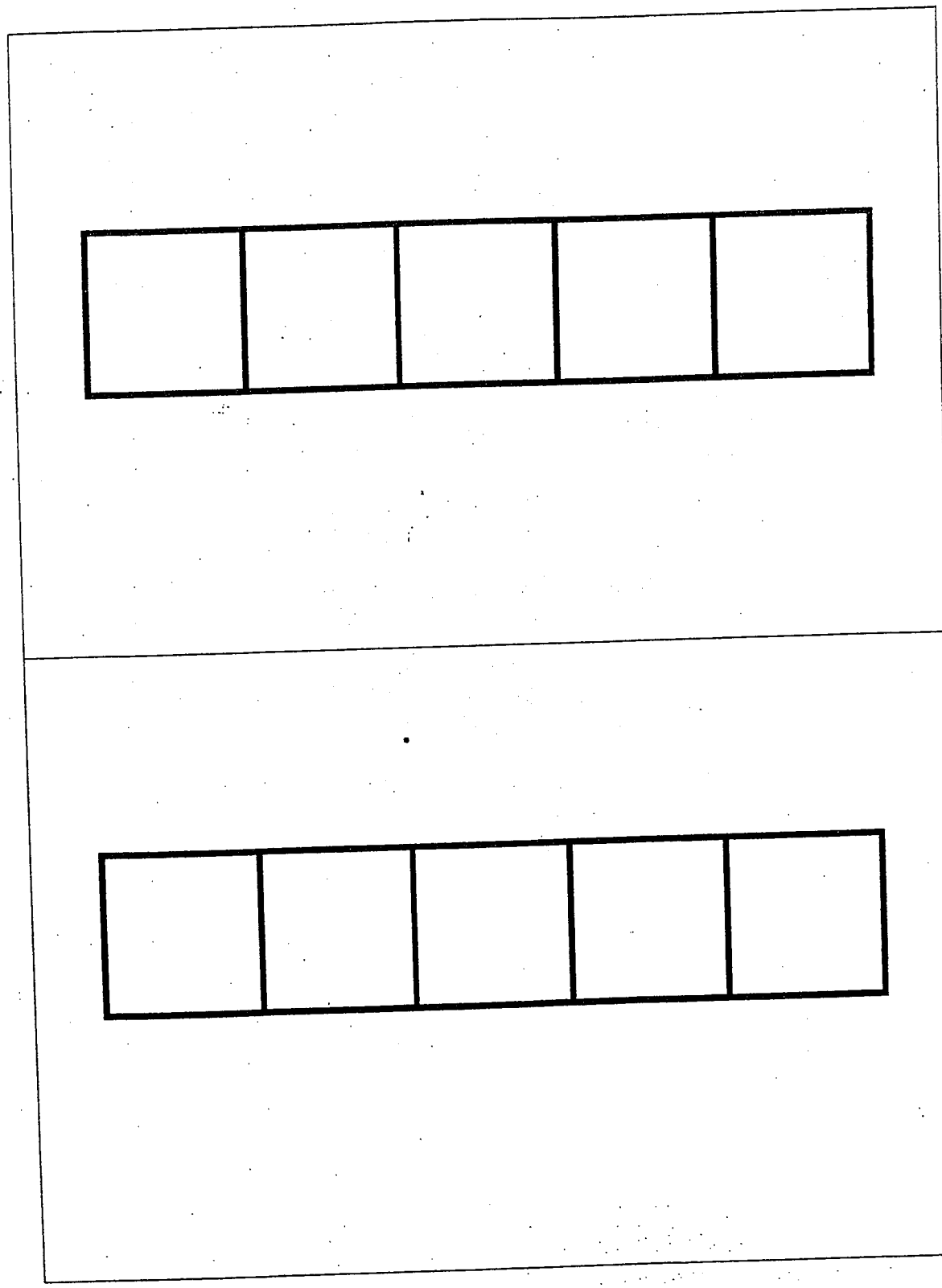
a. Compensation – If it was 10 on top it would be 16, but it is only 8, so take 2 off, it is 14
b. Transformation (10 as a reference) – take 2 from the 6 and put it with the 8 to make 10, that leaves 4, 10 and 4 is 14
c. Transformation (doubles as a reference) – take 1 from the 8 and put it with the 6, that makes 7 and 7, that's 14
d. Partitions involving five – take the 5 out of the 8 and the 5 out of the 6 to make a ten, that leaves 3 and 1, which is 4, and 10 plus 4 is 14 . . .

Other questions (with or without materials):
What goes with 14 to make 20?
What goes with 3 to make 20?
Tell me 2 numbers that make 17?
How many is 20 take away 7?.
How many is 14 and 2 more?





5-Frames



Activity 3

***Counting On* framework reference: Level 0**

Check that students know instinctively the result of adding a single digit to 10: for example, that 10 + 6 = 16. If there is any doubt, this problem needs to be dealt with before proceeding with Activity 3.

Use the following routine, varying the first number between 6 and 9 (8 is used as an example) and the second number between 1 and 9 (7 is used as an example), providing the sum is a two-digit number. You might like to follow this activity by recording partitioning on the board, e.g.

8 + 7 = 8 + 7 = 8 + 2 + 5 = 10 + 5 = 15

(5+2)

At first go very slowly, gradually increasing speed as long as students can keep up.

Step	Teacher says:	Students say:	Actions and comments
1	"Show 8 fingers."		Students raise all fingers of left hand and first 3 fingers of right hand.
2	"8 is 5 and...?"	"3"	Students should no longer need to check by seeing how many of the fingers of their right hand are bent down.
3	"How many more to make 10?"	"2"	
4	"How many more do we need to add?"	"5"	
5	"How did you work that out...?"	"8 and 2 is 10 and 5 more makes 15"	Any response that shows that the child used the bridging strategy is acceptable. There are other equally good strategies, for example some students, if asked to add 8 + 7, may use a near doubles strategy and say: "I know that 7 + 7 is 14, so 8 + 7 must be 15". It is important to establish in this context that you are practising the "bridging ten" strategy and so this strategy is to be used for the moment. There should be no suggestion that the near doubles strategy is not equally good at other times.

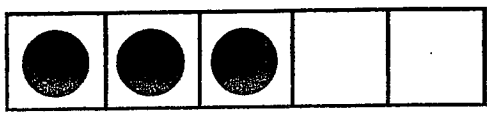
Later you may omit Steps 1 and 2 and start with Step 3. You may also ask sometimes, after Step 4: "Why did you add 5 more?" in order to encourage the child to articulate and so consolidate the reasoning, for example: "5 and 2 make 7, and I had already added 2 to make 10".

Math Recovery: Instructional Framework for Early Number

Instructional Sequence for Combining and Partitioning

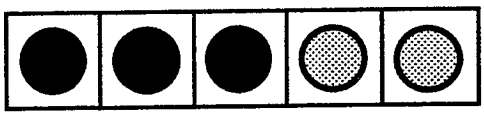
(Key Topic 6.4 in *Teaching Number*)

Combinations to 5



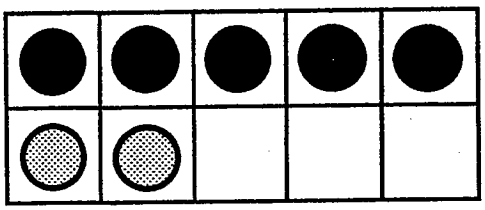
How many black counters?
How many more to make five?

Partitions of 5



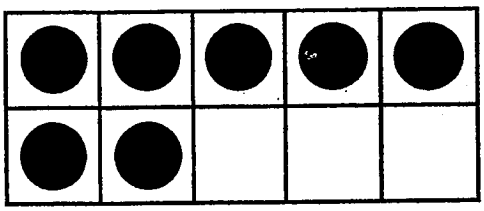
How many black counters?
How many grey counters?
How many altogether?

5+ aspect of 6-10



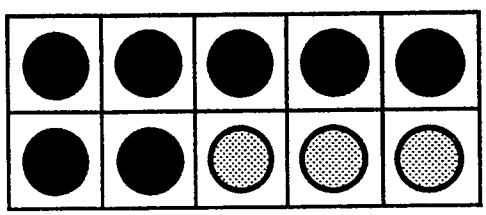
How many black counters?
How many grey counters?
How many altogether?

Combination to 10



How many black counters?
How many more to make ten?

Partitions of 10



How many black counters?
How many grey counters?
How many altogether?

5 Frame

1. How many blue counters?
2. How many more to make 5?

1. How many blue counters?
2. How many yellow counters?
3. How many altogether?

Five-Frame/Ten-Frame Activities

Introduction

Five frames and ten frames are one of the most important models to help students anchor to 5 and 10.

Five frames are a 1x5 array and ten frames are a 2x5 array in which counter or dots can be placed to illustrate numbers.

The five frame helps students learn the combinations that make 5. The ten-frame helps students learn the combinations that make 10. Ten-frames immediately model all of the facts from 5+1 to 5+5 and the respective turnarounds. Even 5+6, 5+7, and 5+8 are quickly seen as two fives and some more when depicted with these powerful models.

For students in kindergarten or early first grade who have not yet explored a ten frame, a good idea is to anchor to five by beginning with a five frame.

Starting with Five-Frames

Activities:

1. **Building Sets** (Materials: blank five-frame mat, counters)
   Call out a number to the students, such as 4, and have them show that amount on their mat. They may place the counters in any manner. Ask if they can place the 4 counters down in a different way. Try other numbers from 0-5. Have your students make observations about their placement of counters.
   - *It has a space in the middle.*
   - *It's two and two.*

   Numbers greater that 5 are shown with a full five-frame and additional counters on the mat but not on the frame.

2. **Roll and Build** (Materials: five-frame cards, dice)
   Students roll one die or two dice and build that amount on their five frame mat.

3. **Memory** (Materials: two sets of five-frame cards)
Place the five frame cards face down in an array. Students take turns turning over two cards. They identify the amount on each card. If they are the same they take both cards. Play goes to the next players.

4. **Challenge** (Materials: two sets of five-frame cards in 2 colors)
Each student gets 1 set of cards. Each student turns over the top card of their pile and identifies the amount. The student with the greater amount takes both cards.

5. **Five Frame Flash** (Materials: large five-frame cards)
Flash a five frame card to your students and ask them to identify how many dots they saw. To challenge students ask them to identify one more or one less that the amount of dots. To extend, have them tell you how many empty spaces there are or how many more are needed to make 5.

6. **Five Frame Trains** (Materials: at least two sets of five-frame cards)
Students sequence a random set of five frame cards in order from 1 to 5 and then back to 1, etc. Students practice counting forwards and backwards out loud. Extend by turning over one card in the train and have students identify which number was turned over.

7. **Make 5** (Materials: two sets of five-frame cards)
Place the cards face up in an array. Students try to find two cards that together total 5. To challenge students, turn the cards face down.

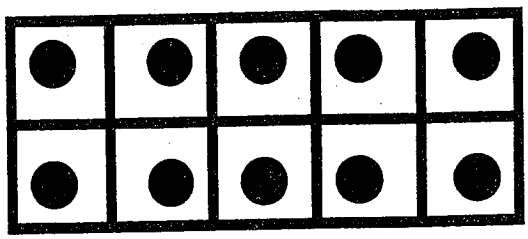
8. **Dice Match** (Materials: die, five-frame cards)
Roll the die and have students find the five-frame card that has the same amount. If they roll a 6, they roll again.

Starting with Ten-Frames

Activities:

1. **Building Sets** (Materials: blank ten-frame mates, double ten-frame mats, counters)
Call out a number from 1-10 and have students build that amount on their ten frame. Students fill the first row first. Call out a different number and have students build the new number. Observe to see which students can simply add or remove counters and those that must begin from 1. Continue with different amounts. Extend to a double ten-frame building numbers to 20.

Five-Frame/Ten-Frame Activities



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   Roll the die and have students find the five frame card that has the same amount. If they roll a 6, they roll again.

Making 5

0	3	2	4
5	1	5	3
4	2	0	4
2	3	5	1
1	0	2	3

Make 5 Games

Make 5 Memory

Use 2 or 4 sets of 5 frame cards. Mix the cards up, then lay them face down in an array on the table. Players take turns turning over 2 cards, in search of a match. A match is two cards that make 5 (ie., 1 and 4, 2 and 3, 5 and 0). If they find a matching pair, they keep the pair, and take another turn. If the cards do not match, play continues with the next player. The winner is the player with the most cards at the end of the game.

Make 5 Go Fish

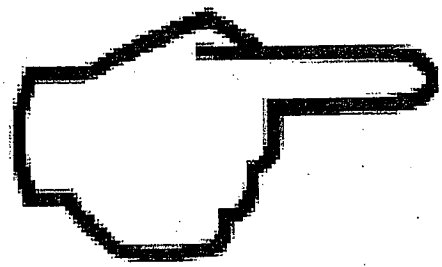
Use 4 sets of 5 frame cards. Five cards are dealt to each player. Remaining cards are scattered face down in the center of the table. Players try to match cards that add up to 5. One player asks the other for a card to make 5 (ie. "Do you have a 3 to go with my 2?"). If player doesn't have the card, the player tells the first player to "go fish" from the center pile. If the card picked is the card asked for, the player lays down his match, and takes another turn. If not, play passes to the next player.

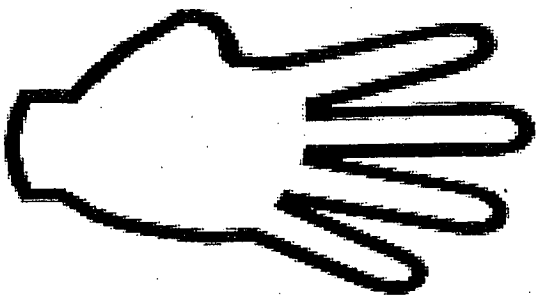
Make 5 Bingo

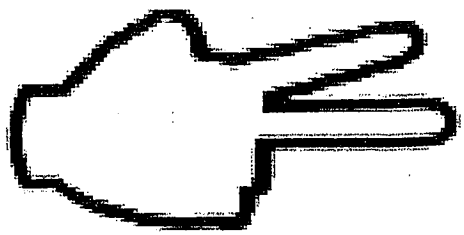
Materials:
Make 5 Bingo game board (below)
Die numbered 0-5
Bingo counters, pennies, macaroni, etc., for marking numbers on the board

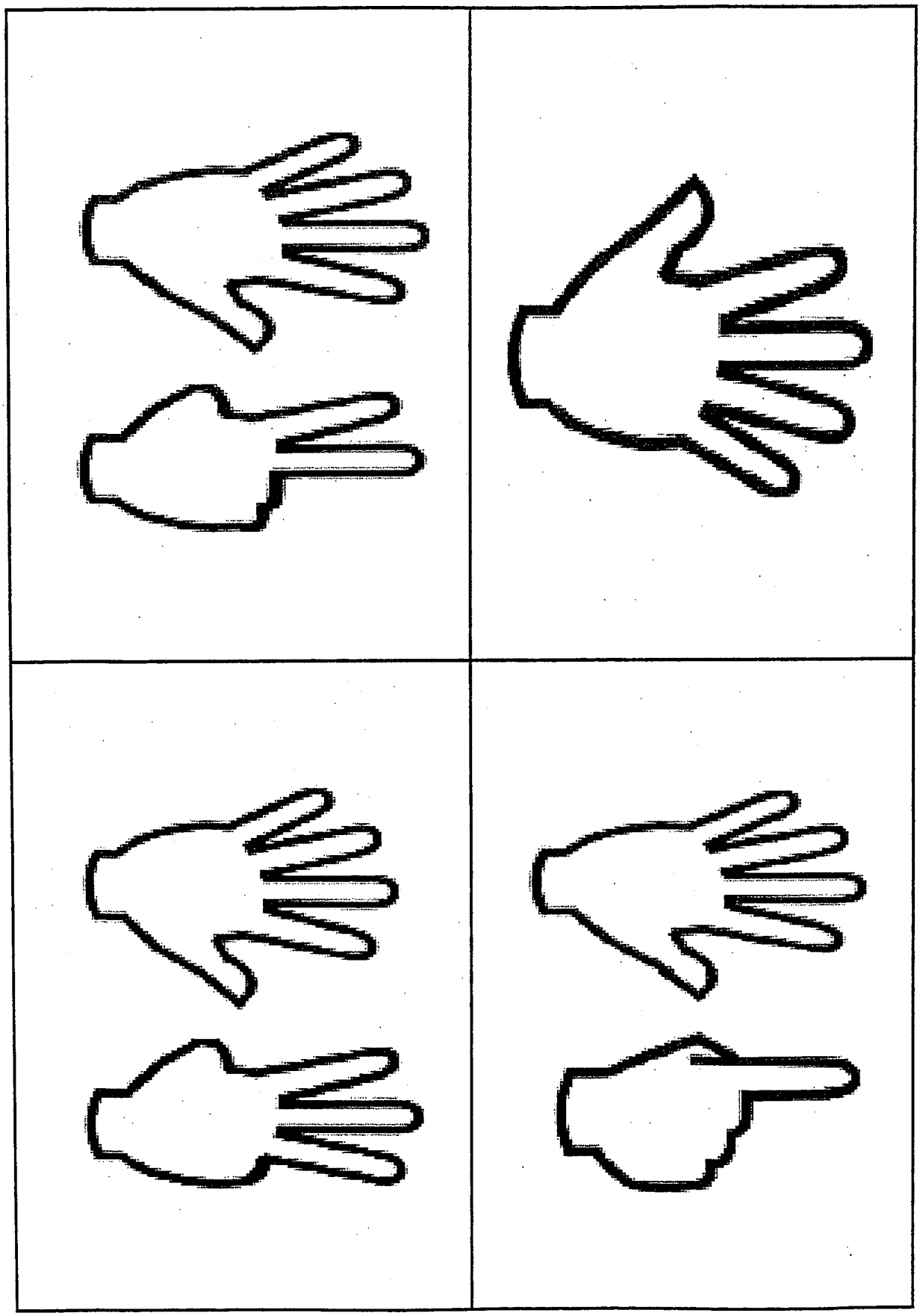
Directions:
Student rolls die and calls out the number that goes with the number rolled to make 5 (ex. If 4 is rolled, student calls out 1). Student places a marker on the number on the bingo board. Bingo is called when the student has placed 5 markers in a row.

5	4	1	3	0
0	2	3	1	4
3	1	Free	4	5
1	5	4	0	1
2	3	5	2	3









zero

one

two

three

four

five

Year 6

Activity 1

***Counting On* framework reference: Level 0**

Use the following routine, varying the number between 0 to 5 (3 is used as an example). At first go very slowly, gradually increasing speed as long as students can keep up.

Step	Teacher says:	Students say:	Actions and comments
1	"Show 3 fingers."		Students raise 3 consecutive fingers of one hand. You may insist that fingers are always shown starting from the little finger of the left hand.
2	"How many more to make 5?"	"2"	Students may check initially before replying by seeing how many of the fingers of their left hand are bent down.
3	"What makes 5?"	"3 and 2 make 5"	
4	"5 take 3 is...?"	"2"	
5	"5 take 2 is...?"	"3"	

Activity 2

***Counting On* framework reference: Level 0**

Use the following routine, varying the number between 5 and 10 (6 is used as an example). At first go very slowly, gradually increasing speed as long as students can keep up.

Step	Teacher says:	Students say:	Actions and comments
1	"Show 6 fingers."		Students raise 5 fingers of one hand and 1 of the other. Encourage students to use all the fingers on one hand for this activity.
2	"6 is 5 and...?"	"1"	
3	"How many more to make 10?"	"4"	Students may check initially before replying by seeing how many of the fingers of their hand are bent down.
4	"What makes 10?"	"6 and 4 make 10"	
5	"10 take 6 is...?"	"4"	
6	"10 take 4 is...?"	"6"	

(Before moving to Activity 3, which uses the previous activity as a basis for adding two single digit numbers by "bridging", it may be helpful to use the *Grids to ten* activity. These will provide another set of visual clues for students.)

Finger Patterns
(In the Range of 1-5)

Italics represent what you would say to the student(s). Each task is a higher level than the one before it.

1. *Show me 3 on your fingers.* Then 5, 2, 4, 1. Then, have them do it with the other hand.
Watch for lifting fingers sequentially (counting from 1) vs. simultaneously.

2. Model "throwing out" fingers to move from lifting fingers sequentially to lifting them simultaneously. *Watch me as I flash a number on my fingers.* Flash 1: say "*1*" as you throw out 1 finger, repeat for 2, 3, 4, 5. *Now you try to flash 1, 2, 3, 4, 5.* Then do them in random order.

3. *Show me 2 on your fingers. How many fingers are down? How many fingers altogether?* Repeat for 1-5. Then switch hands.

4. *Show me 2 on your fingers. How many more to make 5?* Repeat for 1-5. Then switch hands.

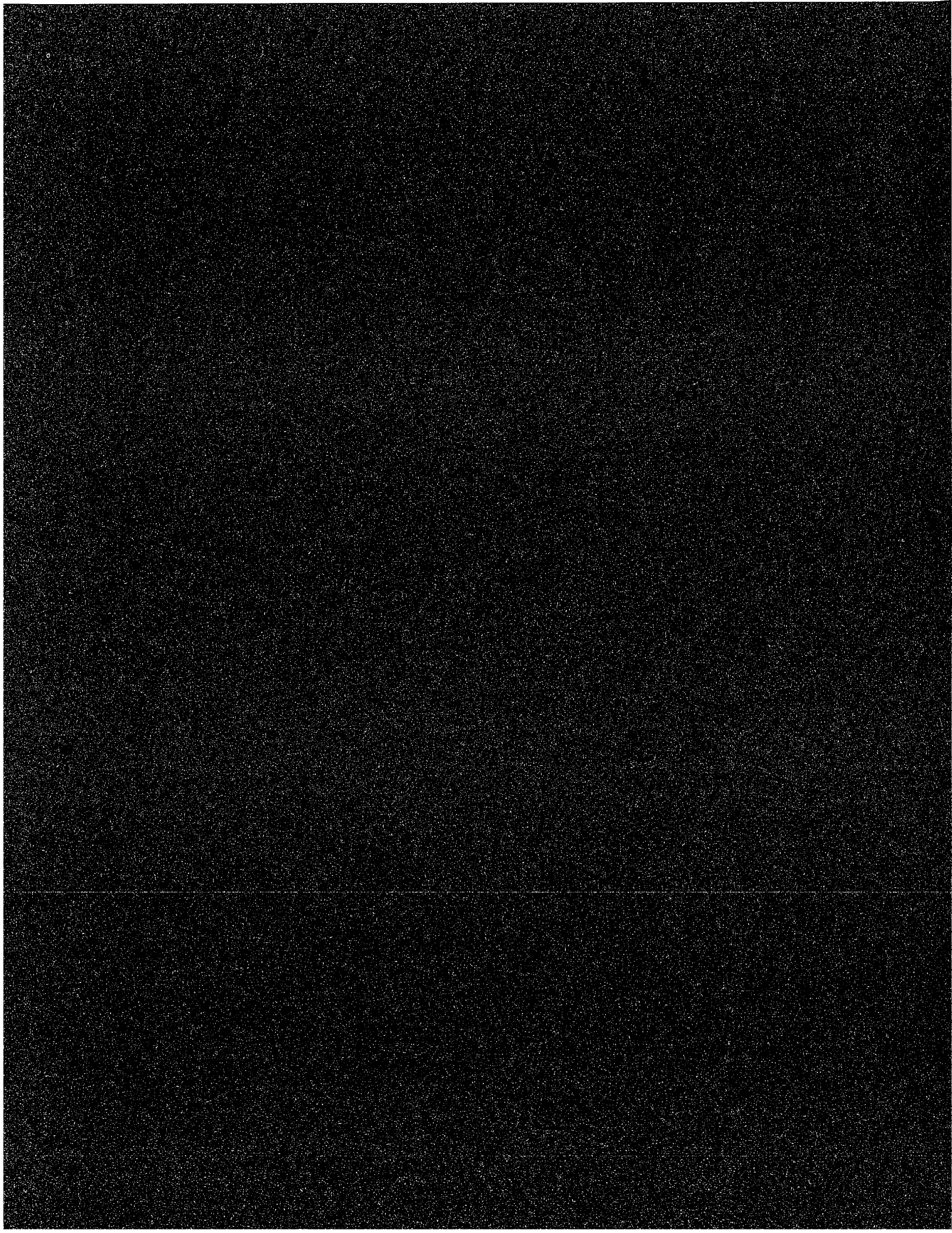
(In the Range of 6-10)

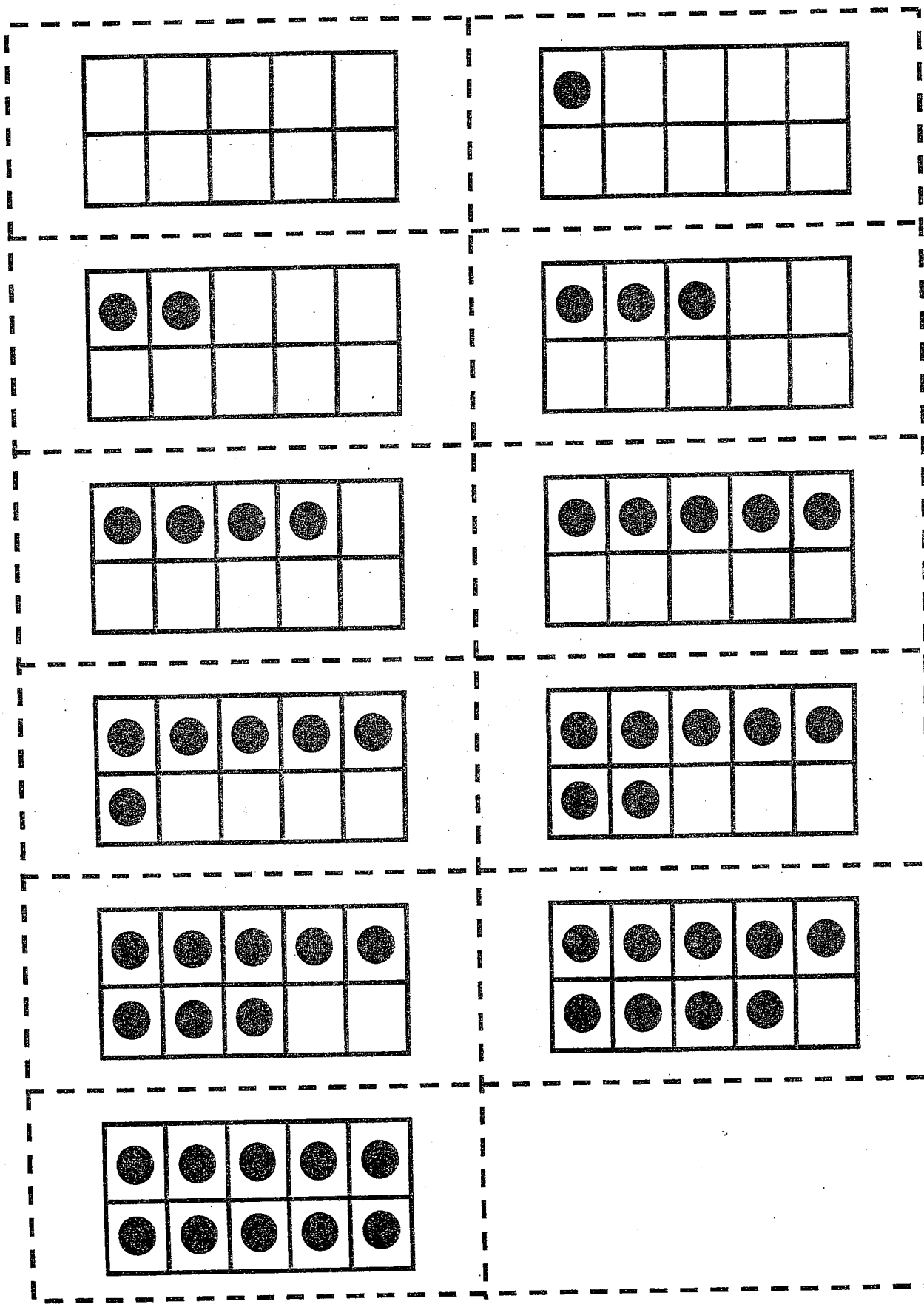
5. *Show me 5 on one hand. Show me 3 on the other hand. How many altogether?* Repeat for making 6-10.

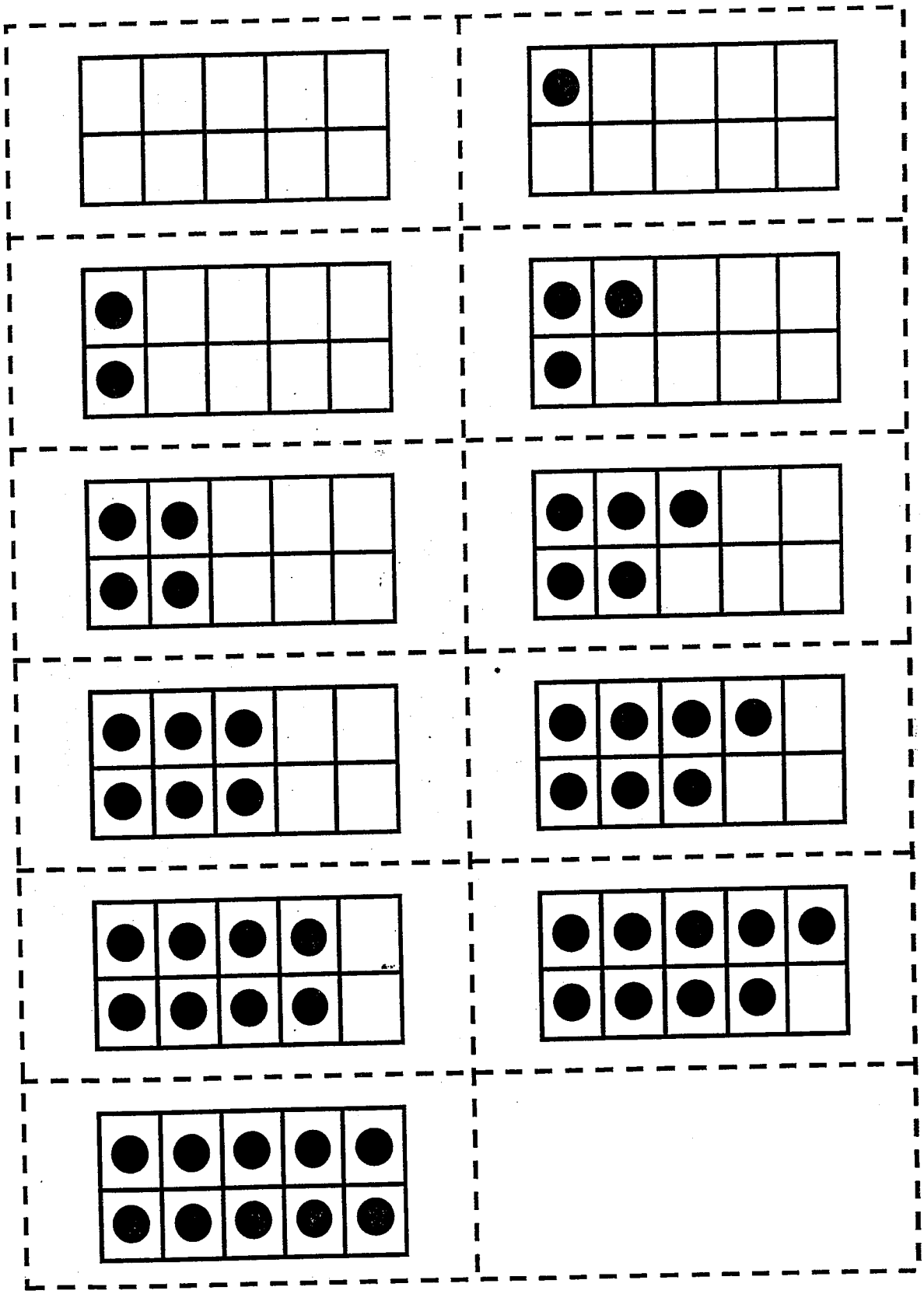
6. *Show me 5. Now make 8.* Repeat for 6-10.

7. *Show me 7. How many fingers are down? How many fingers altogether?* Repeat for 6-10.

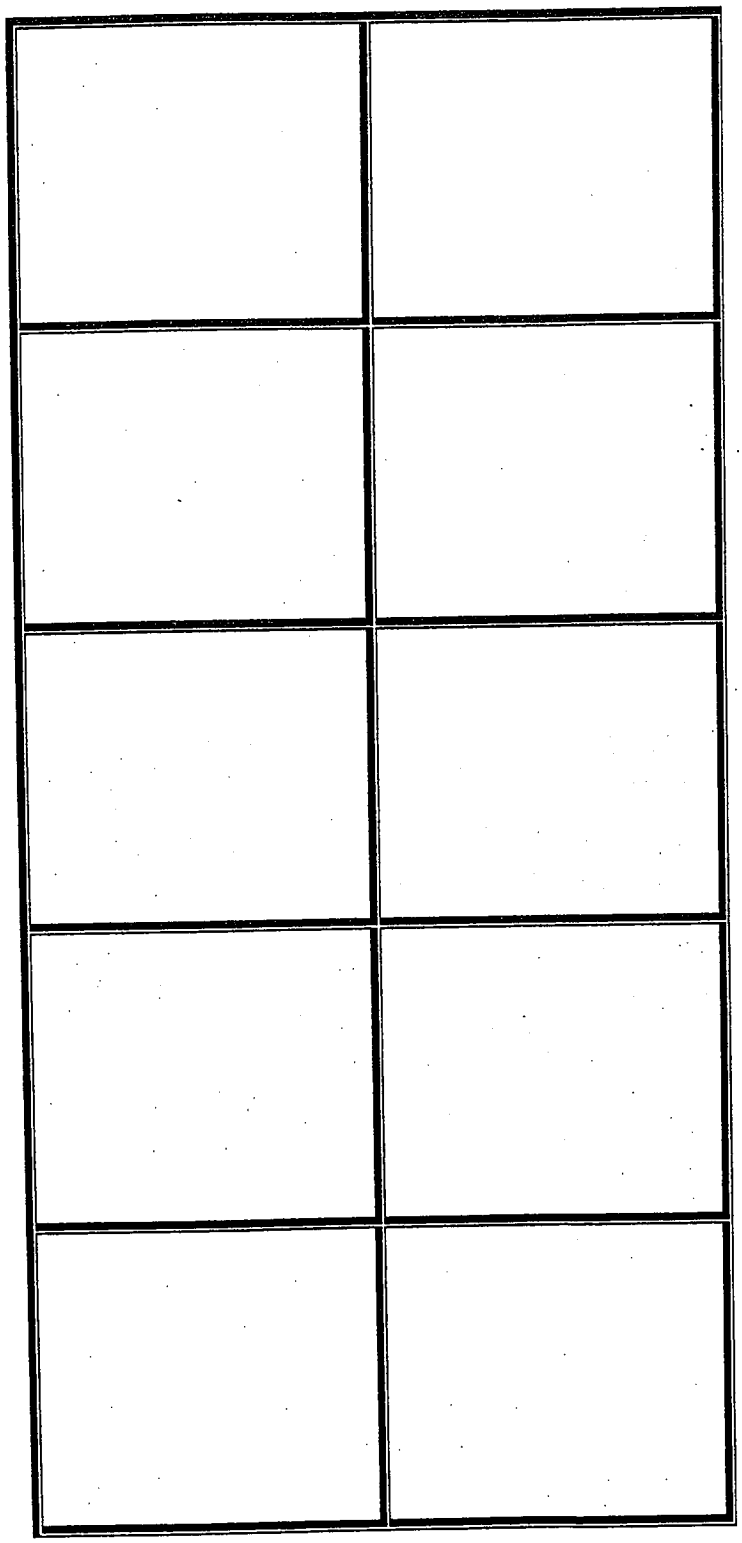
8. *Show me 8. How many more to make 10?* Repeat for 6-10.

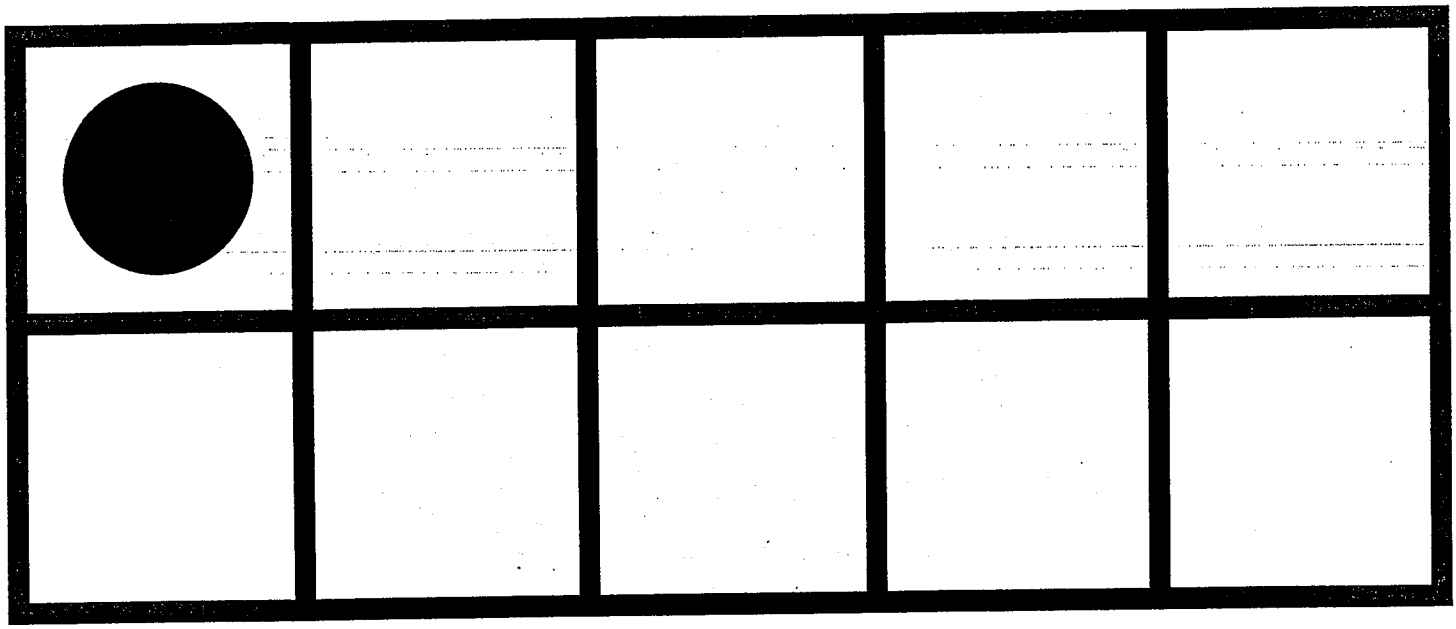


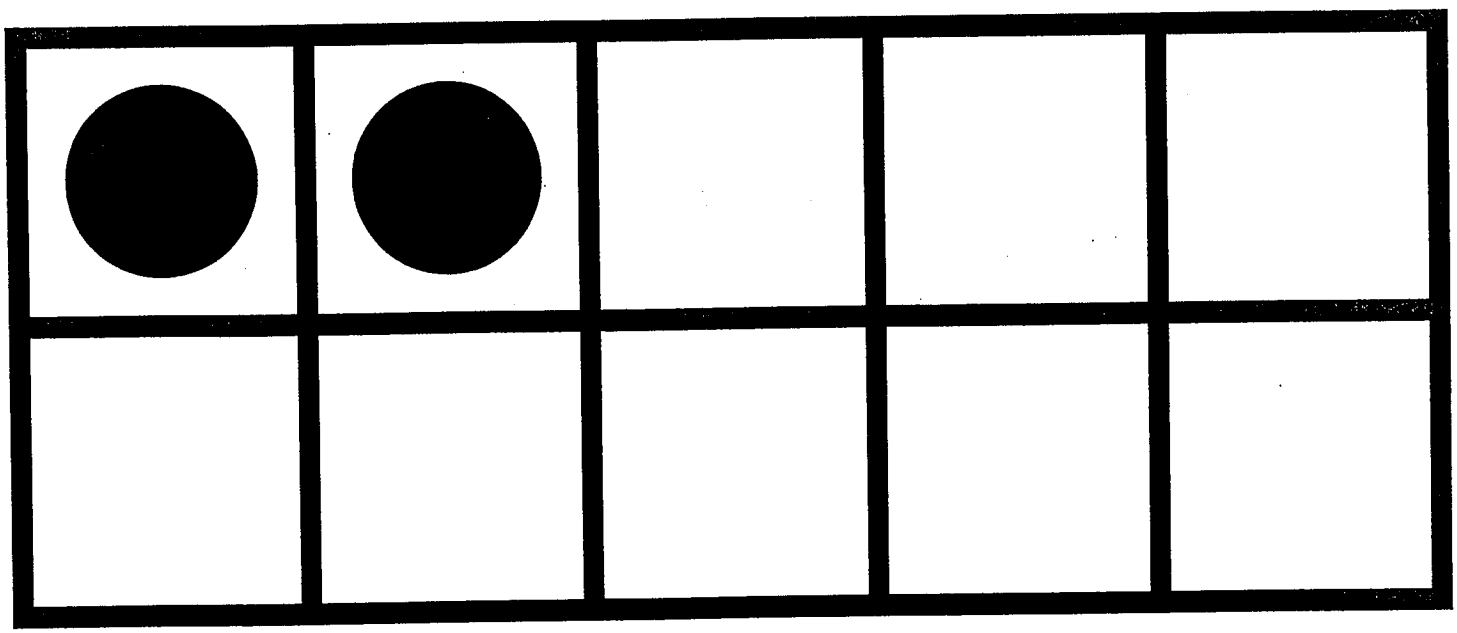


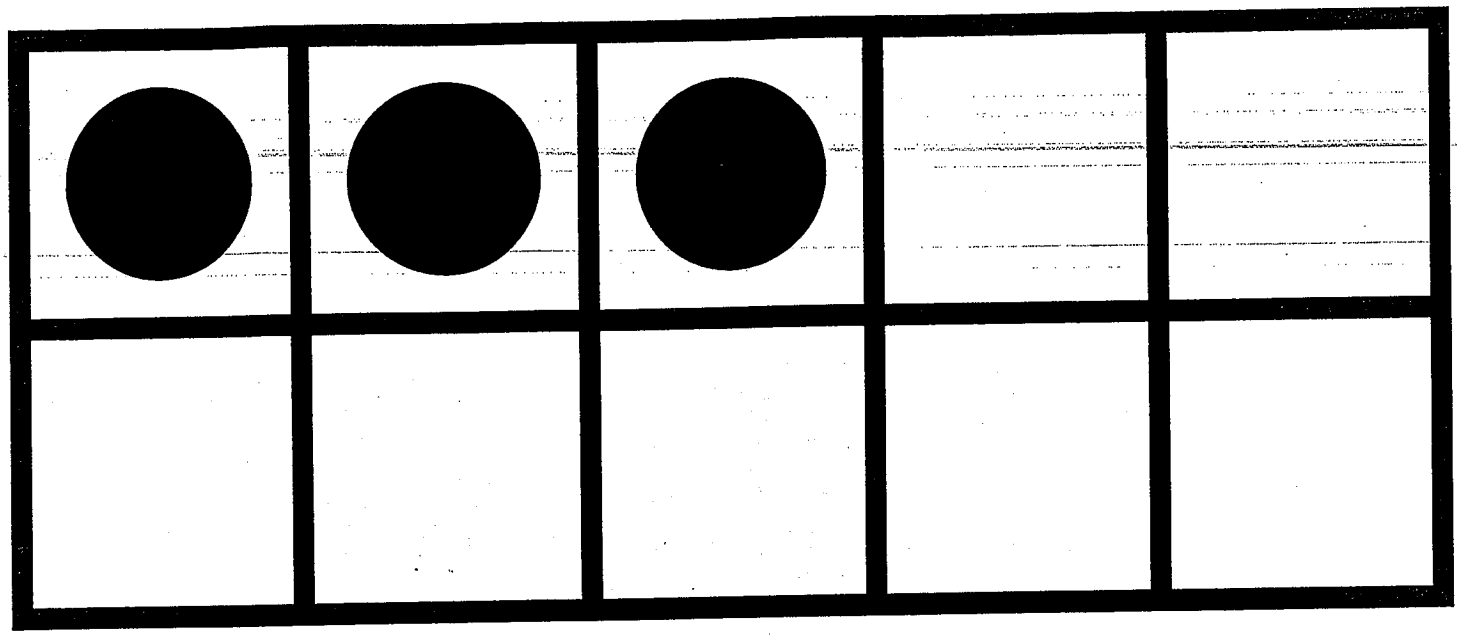


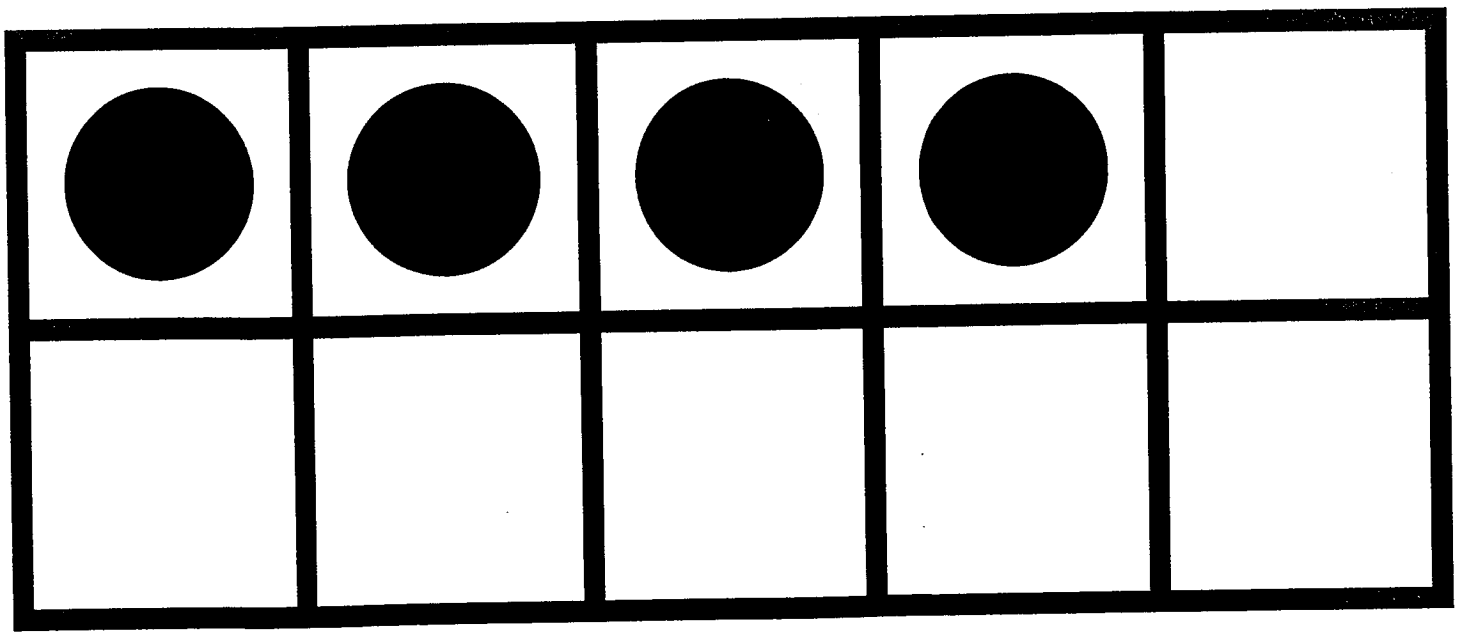
Ten-Frame

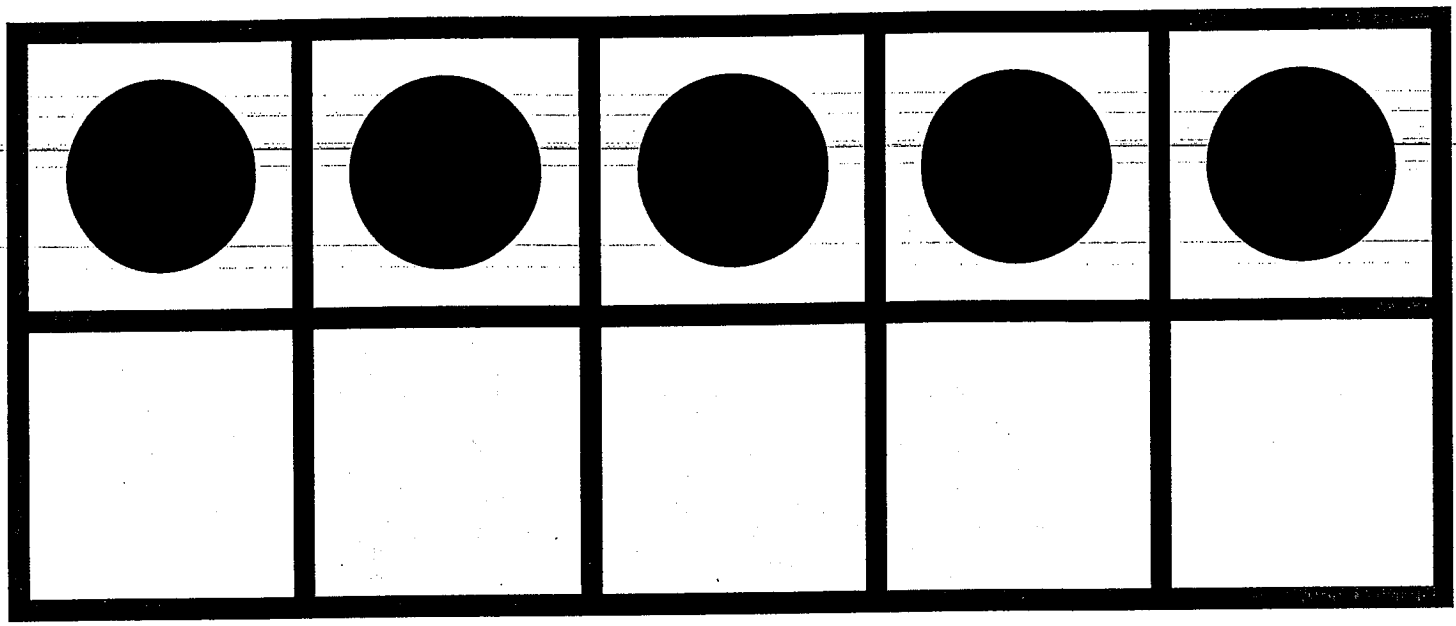


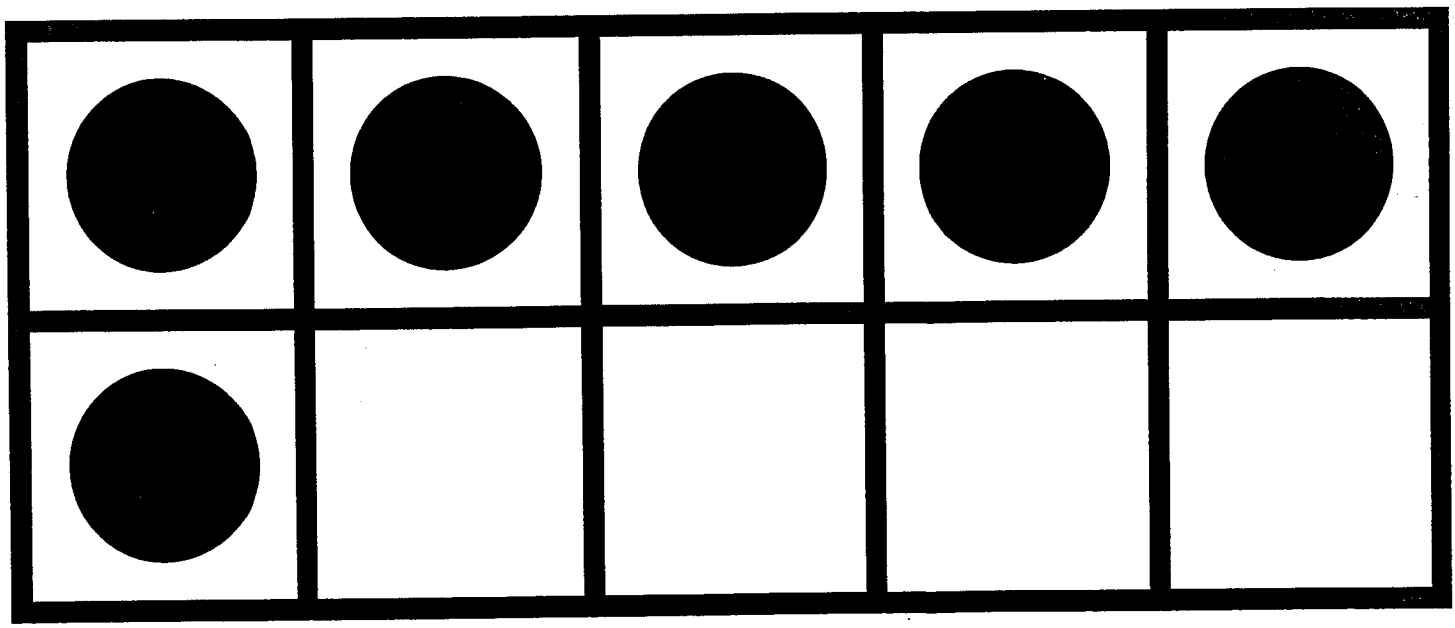


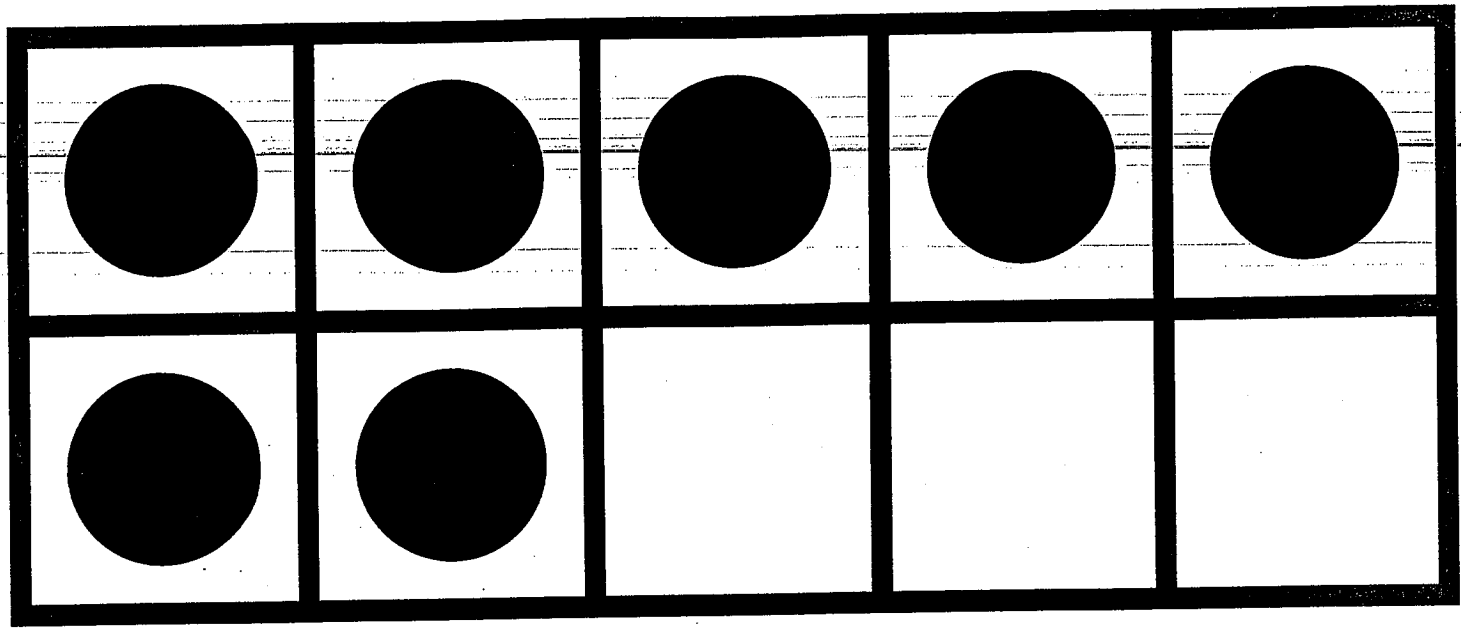


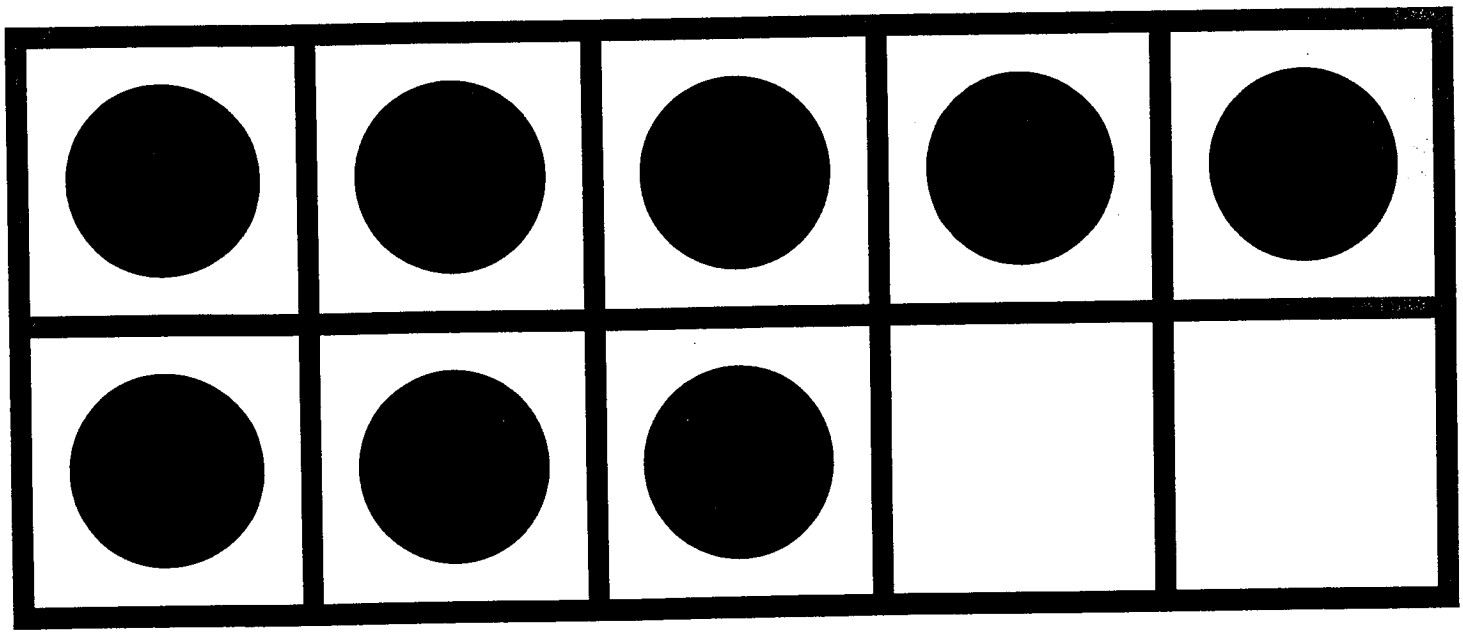


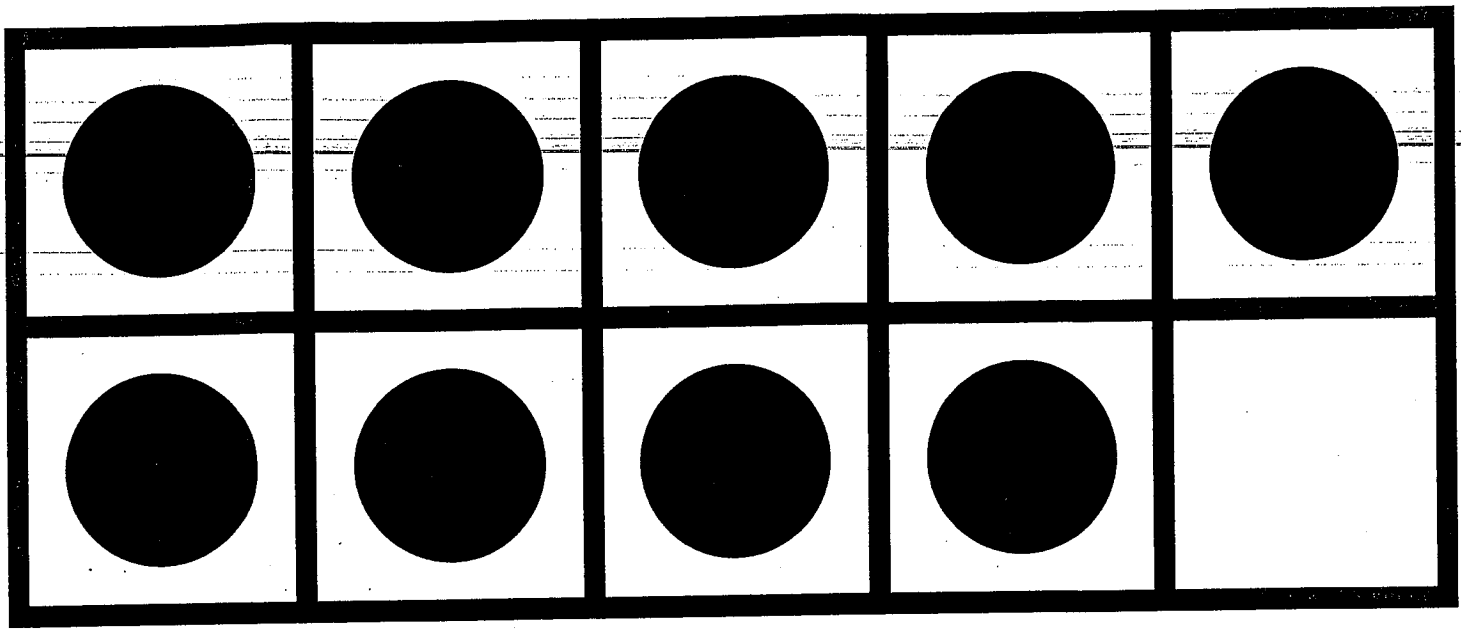


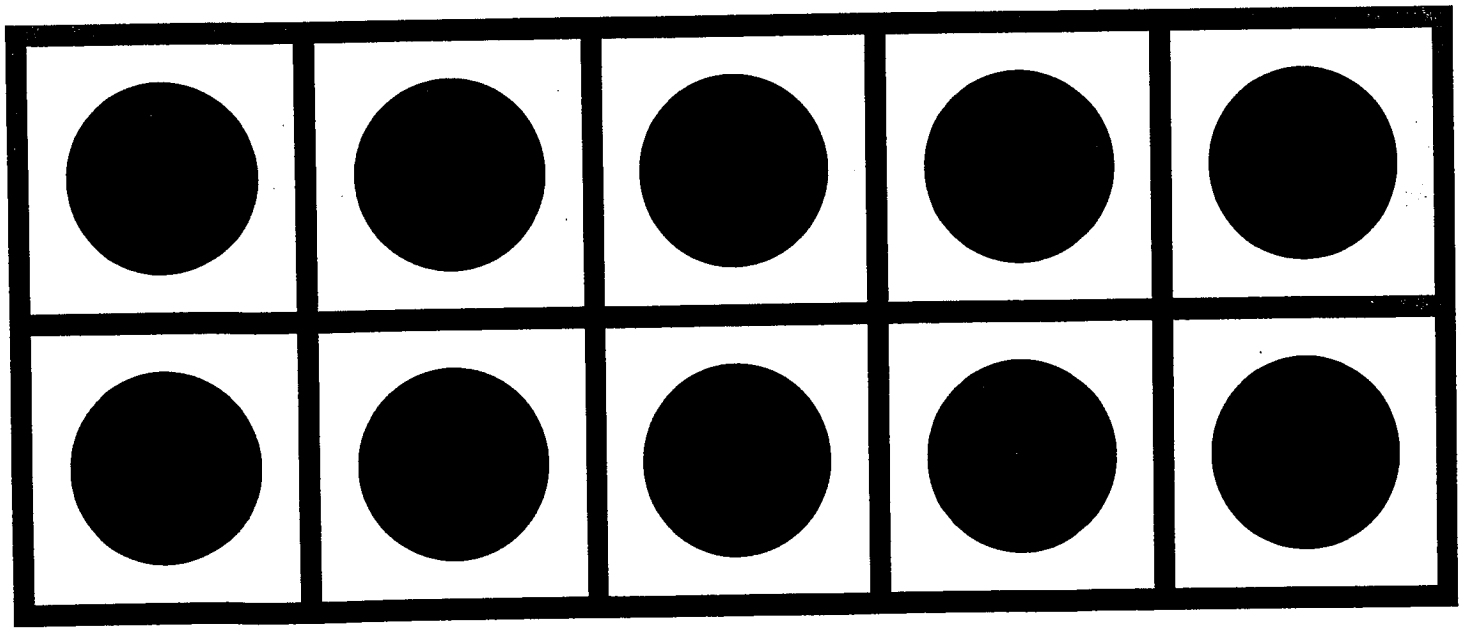


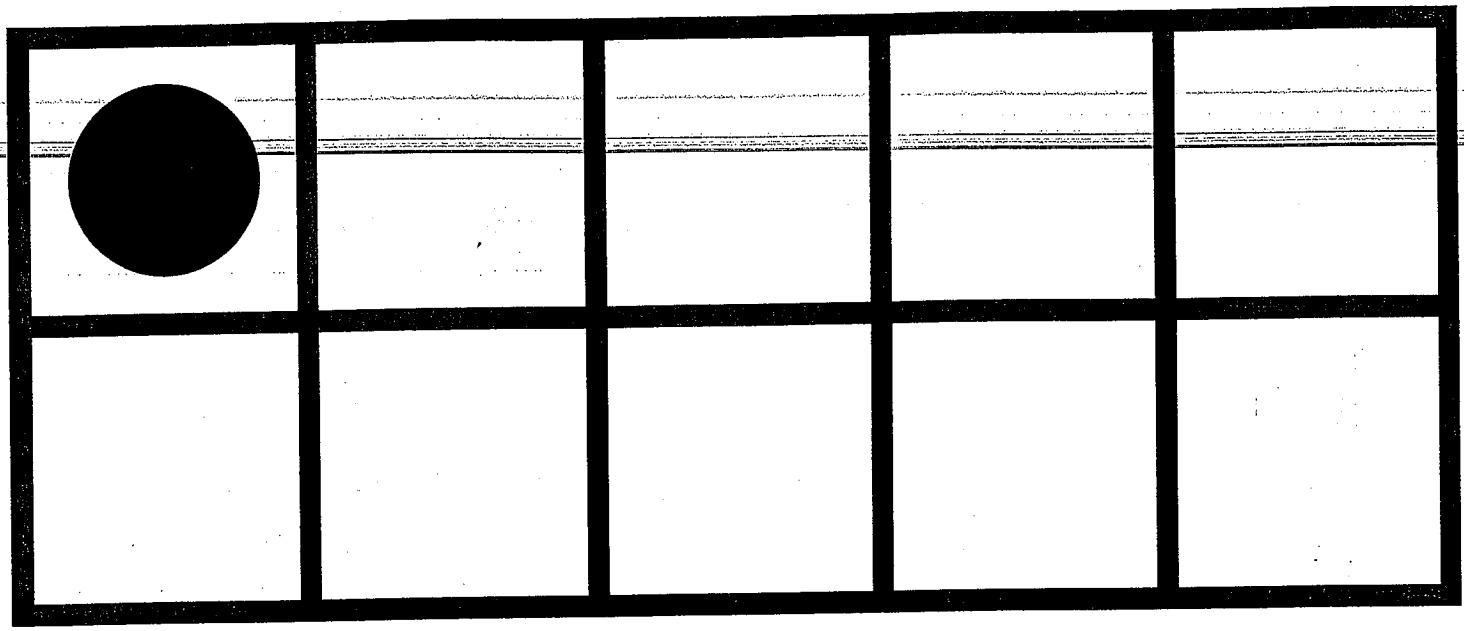


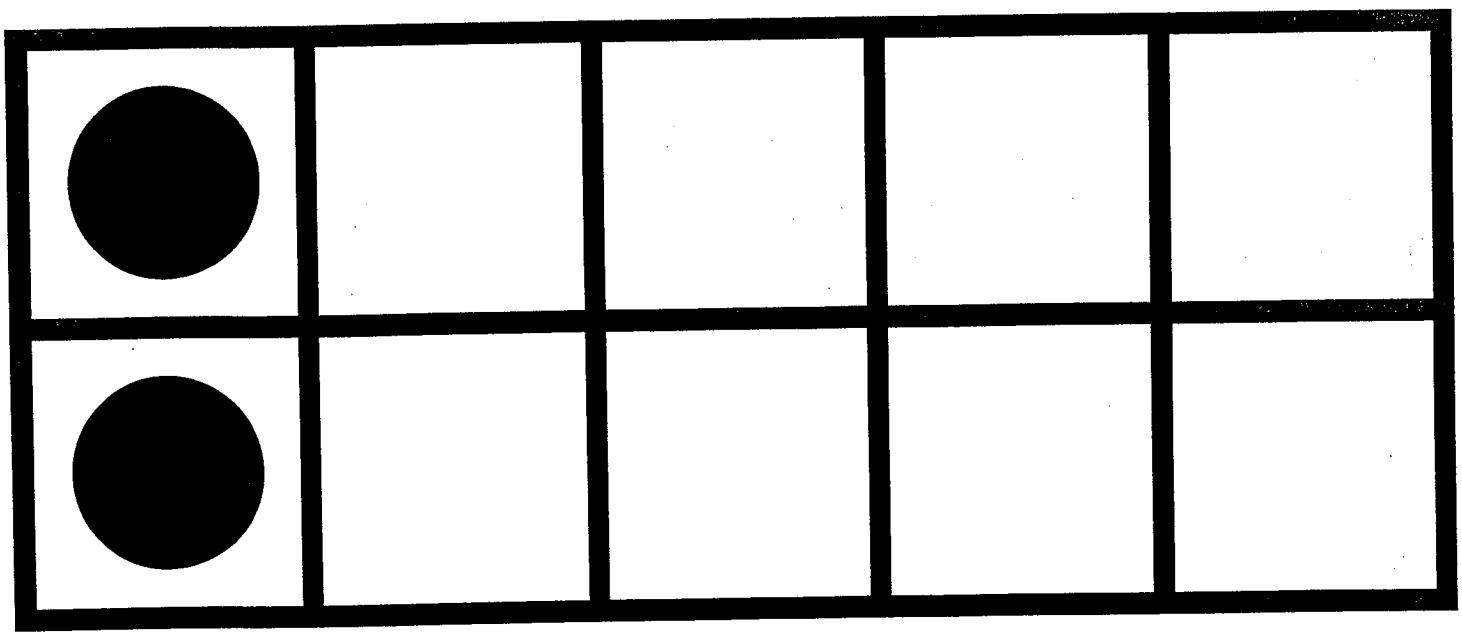


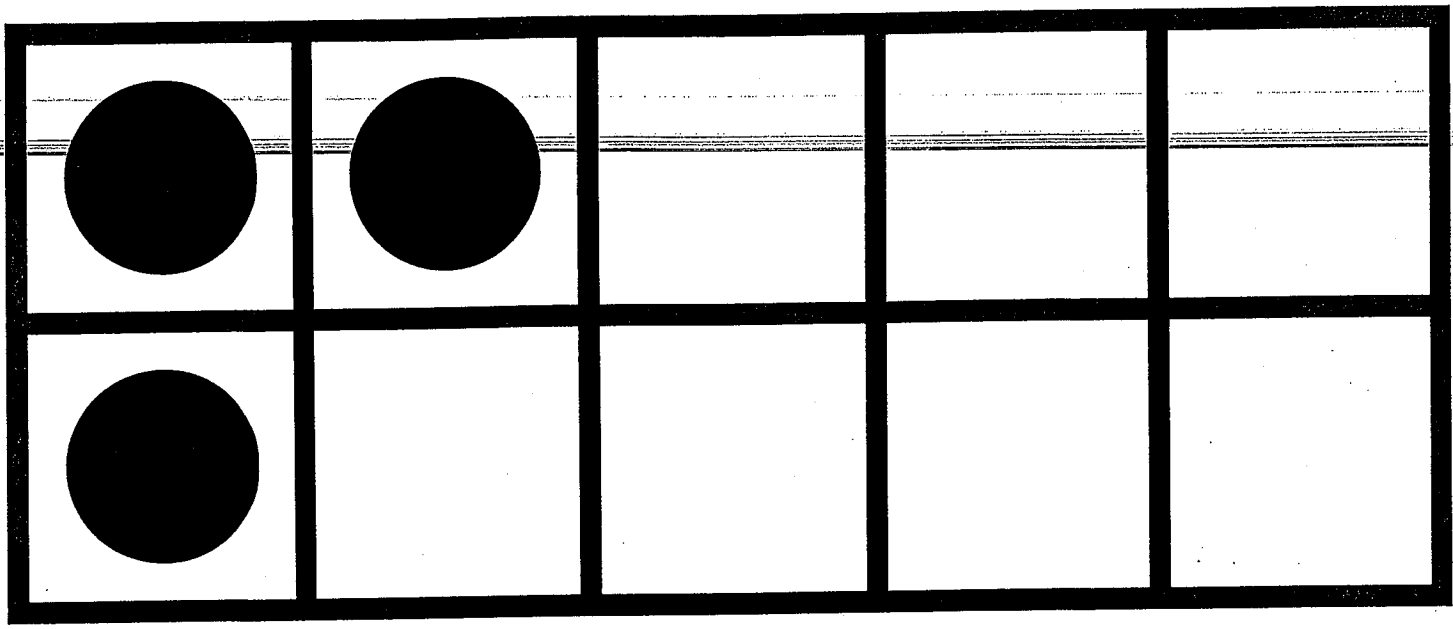


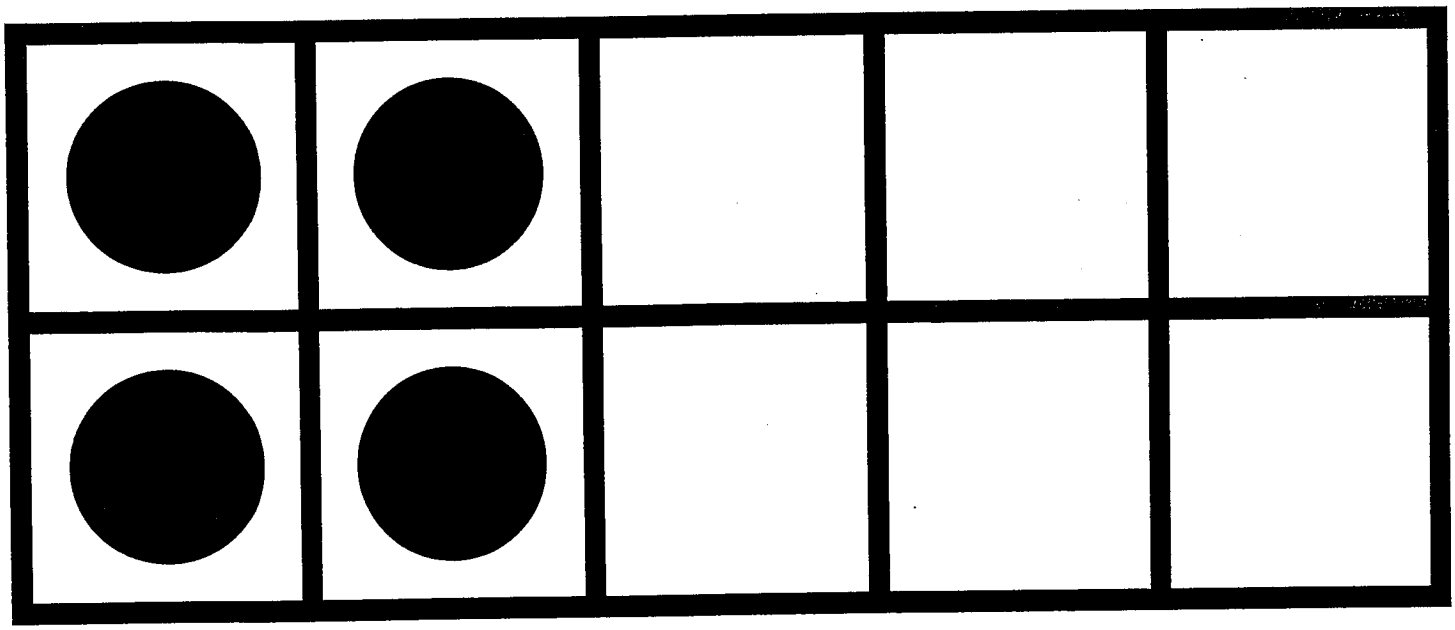


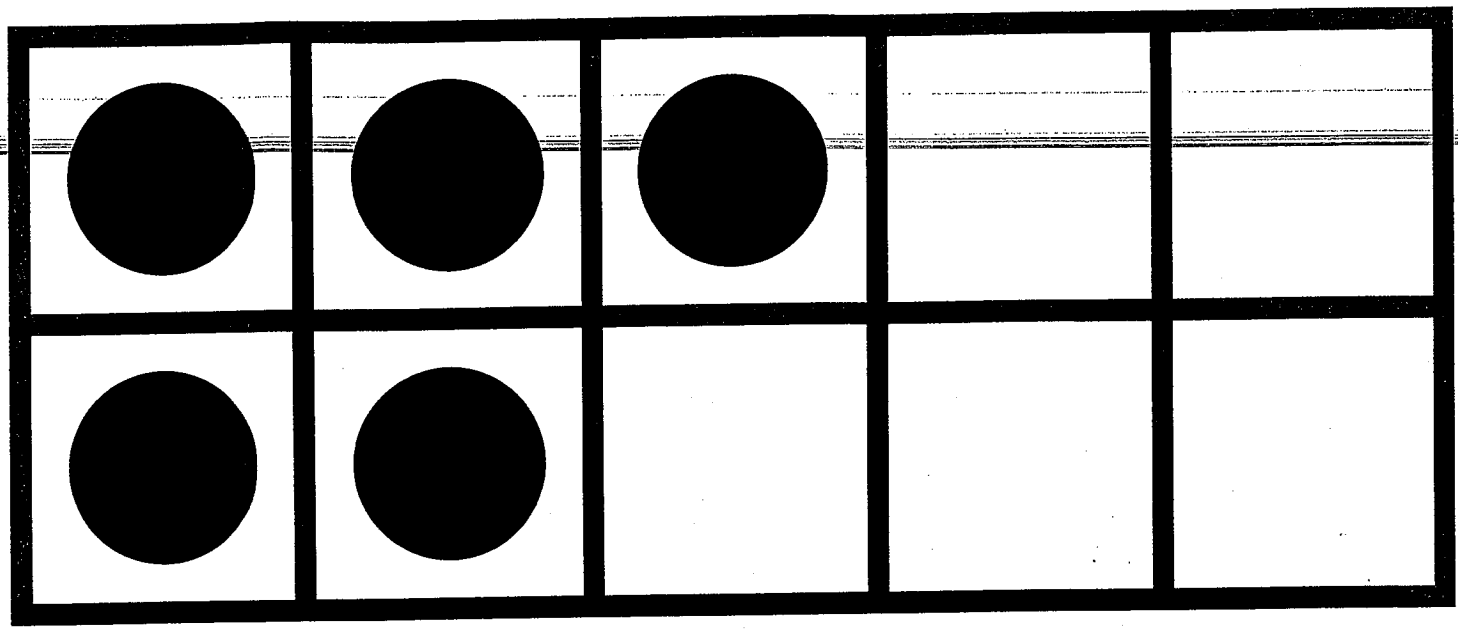


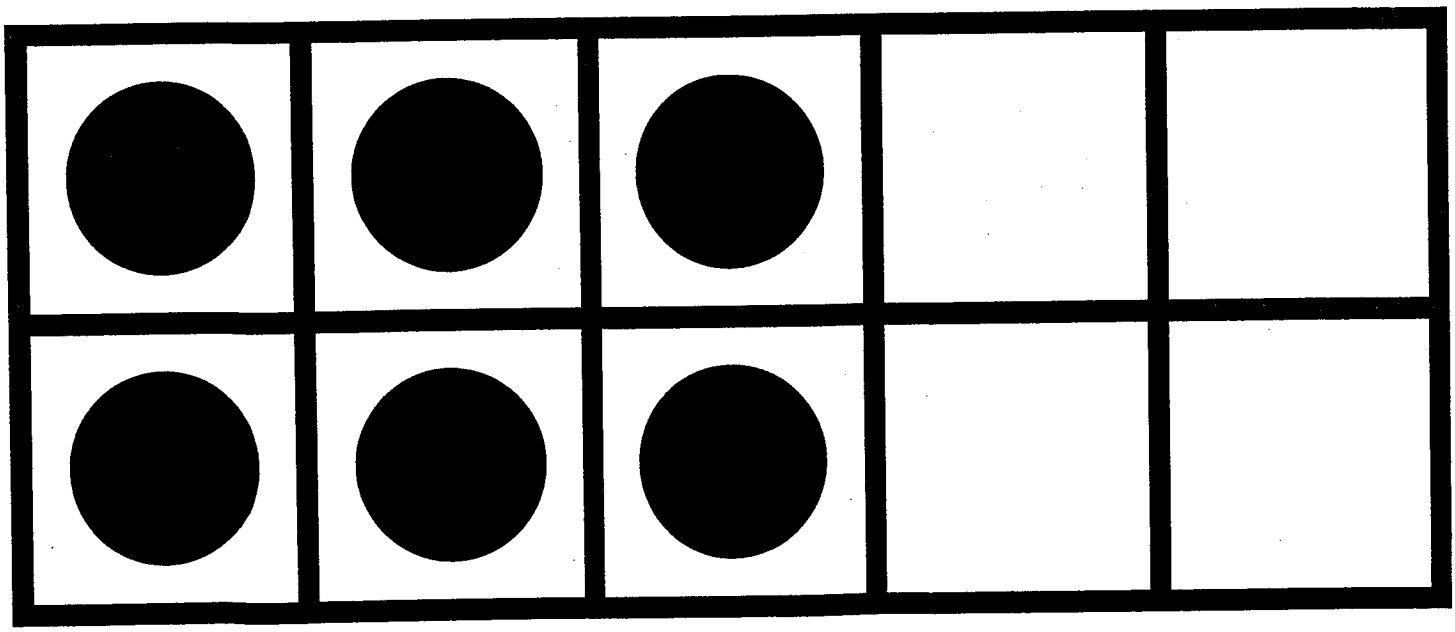


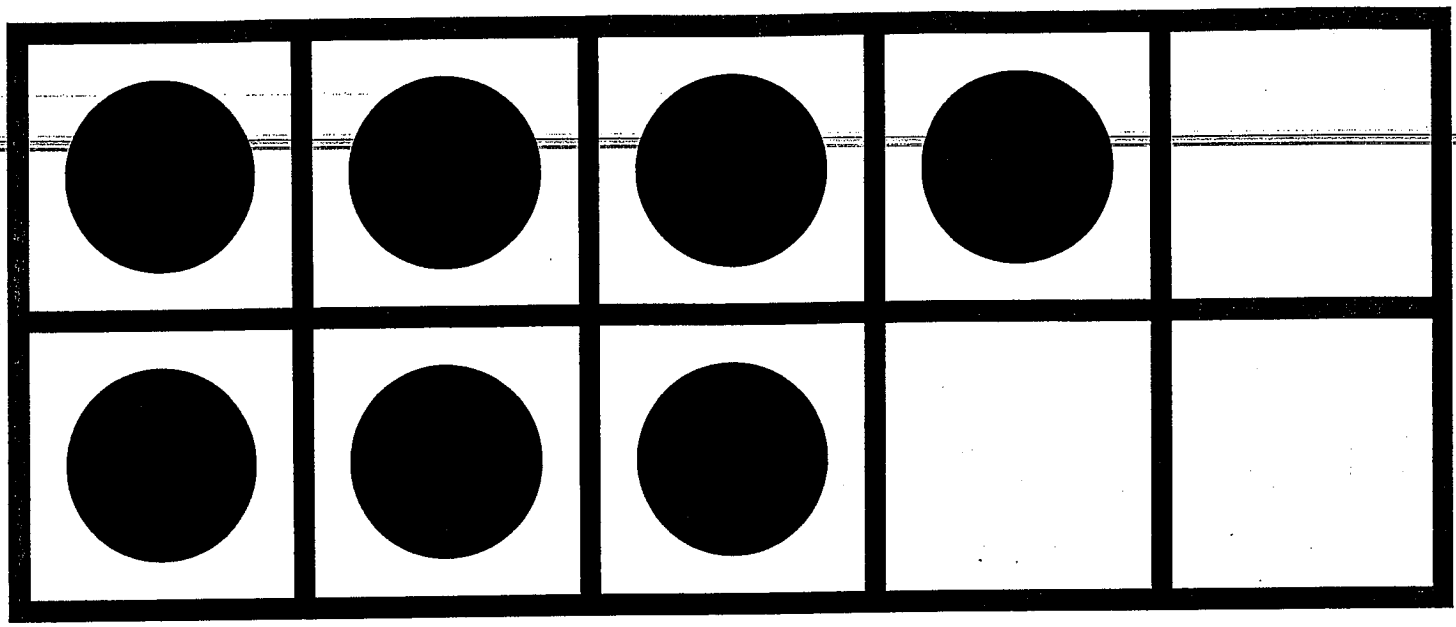


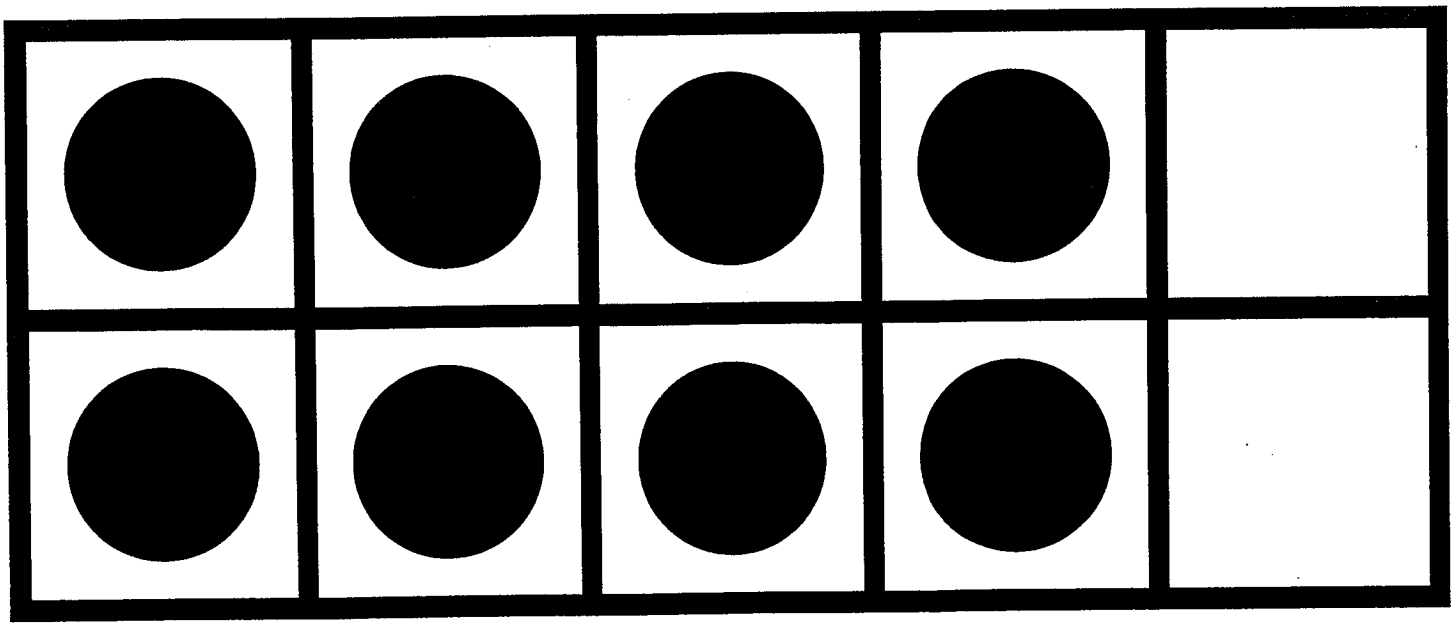


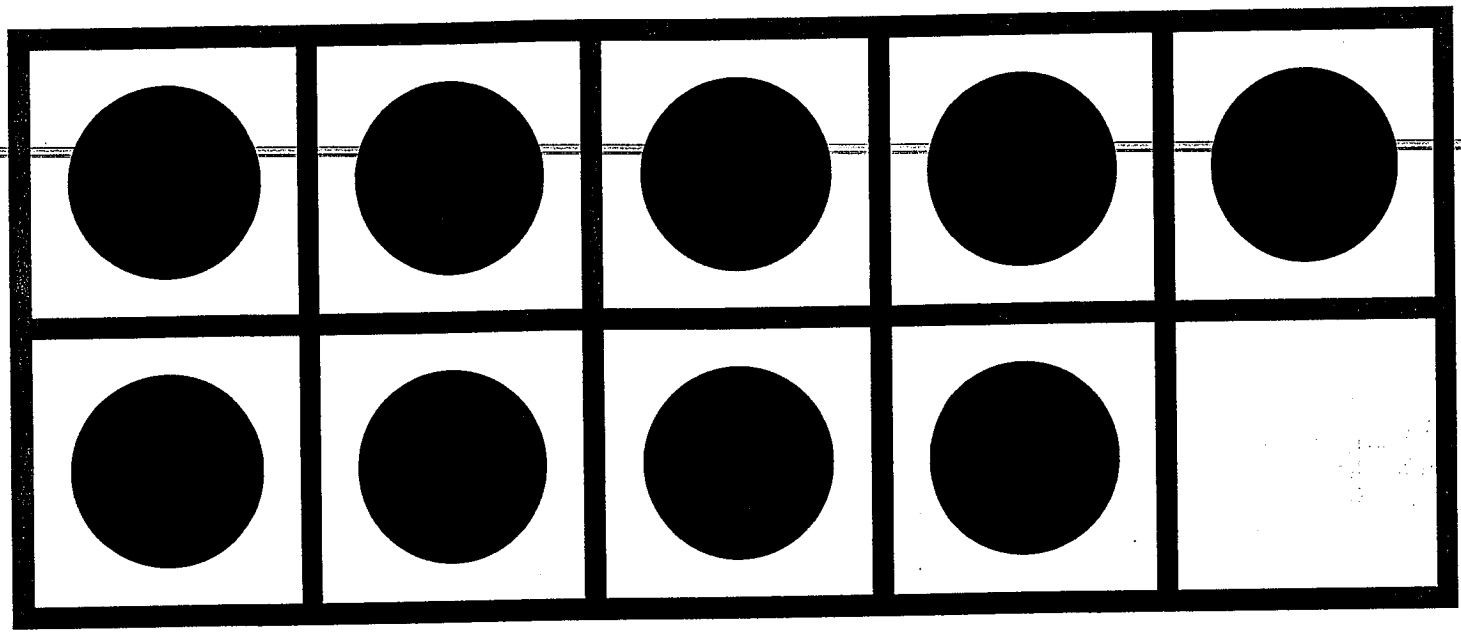


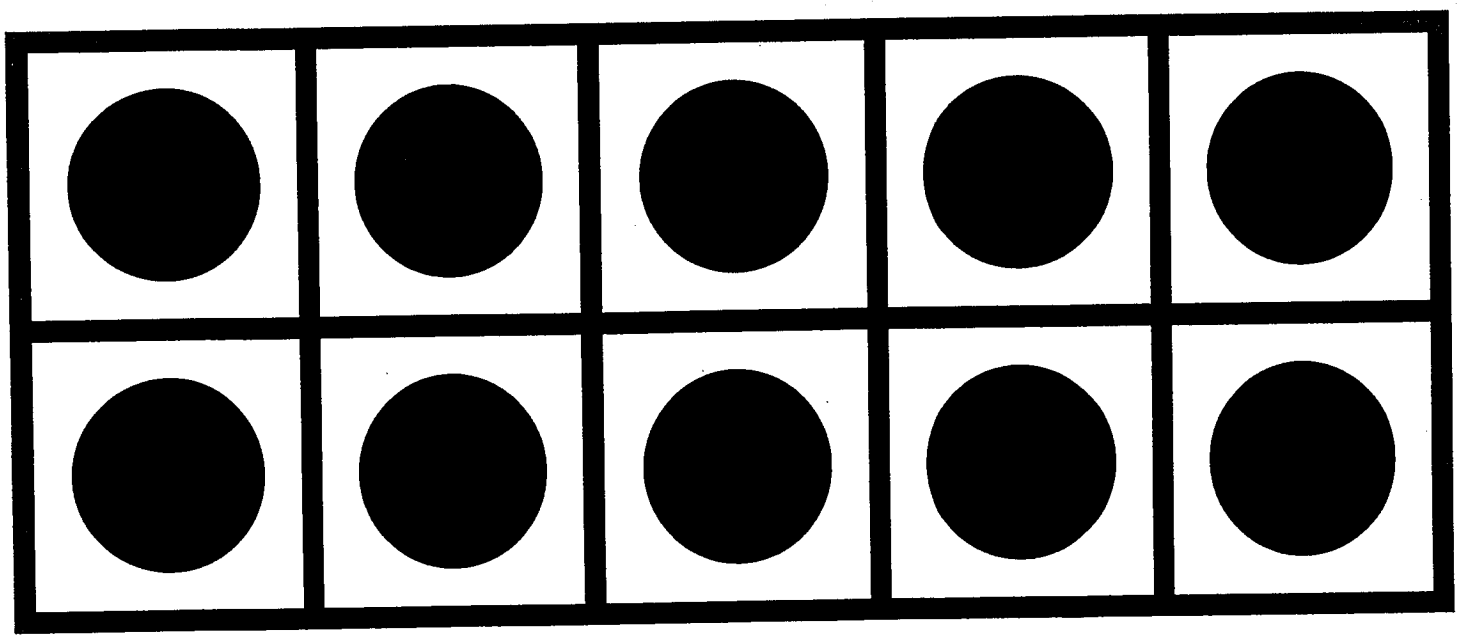


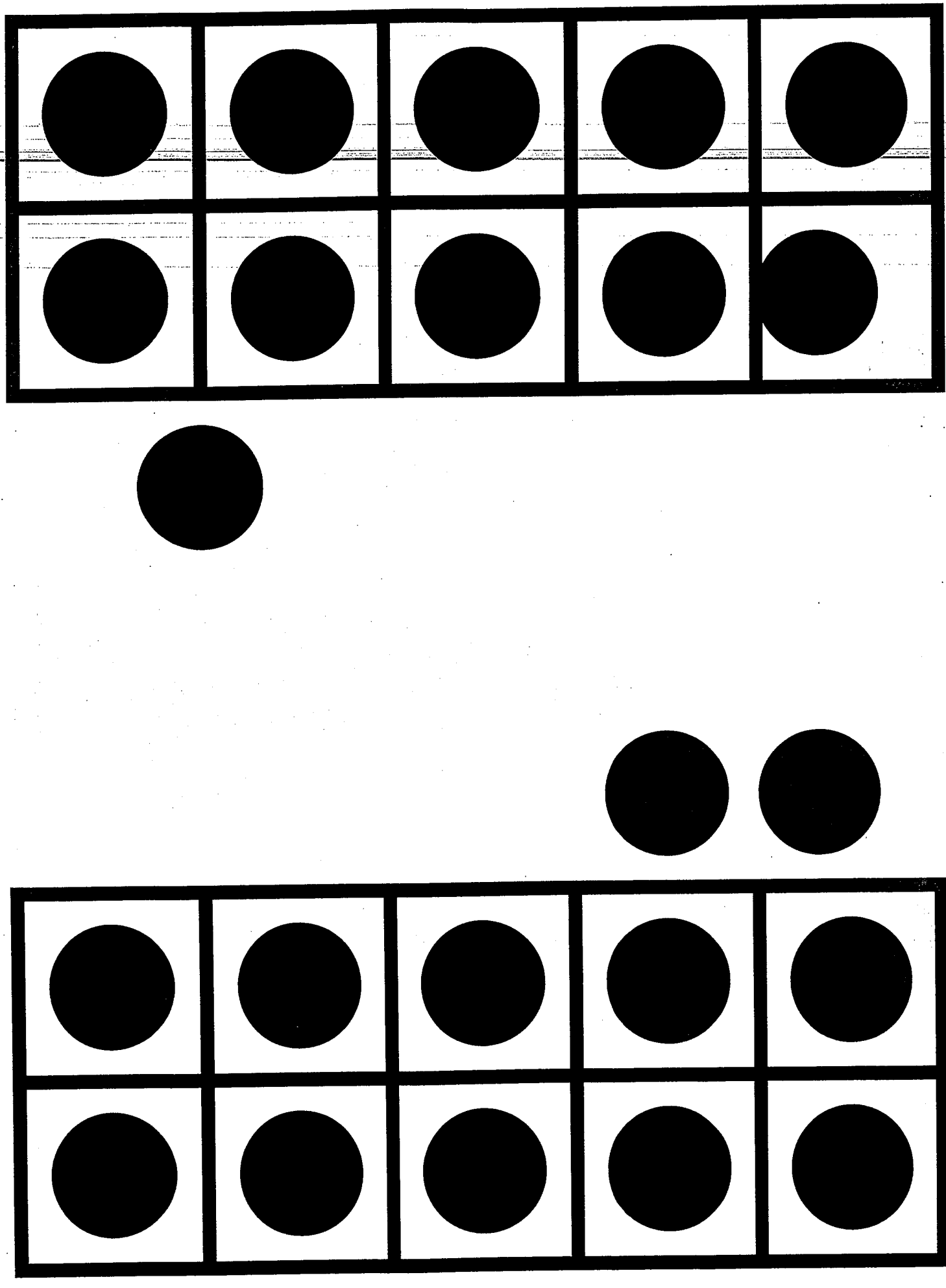


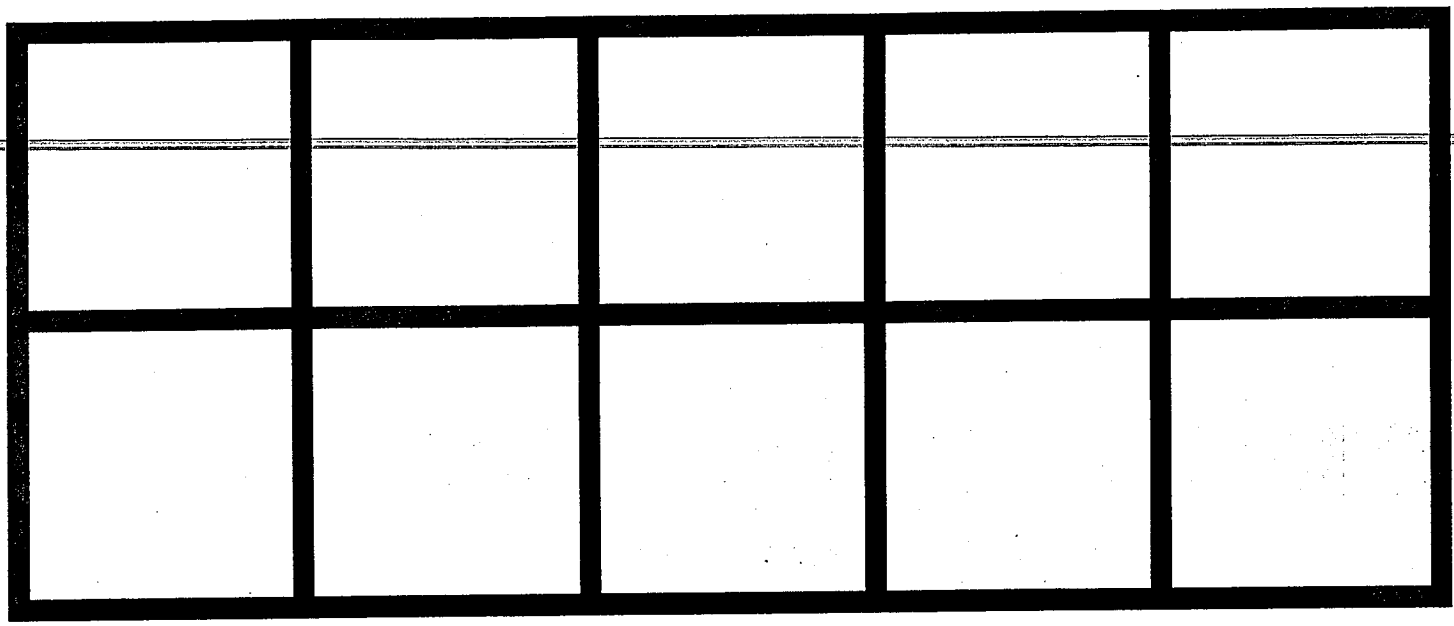


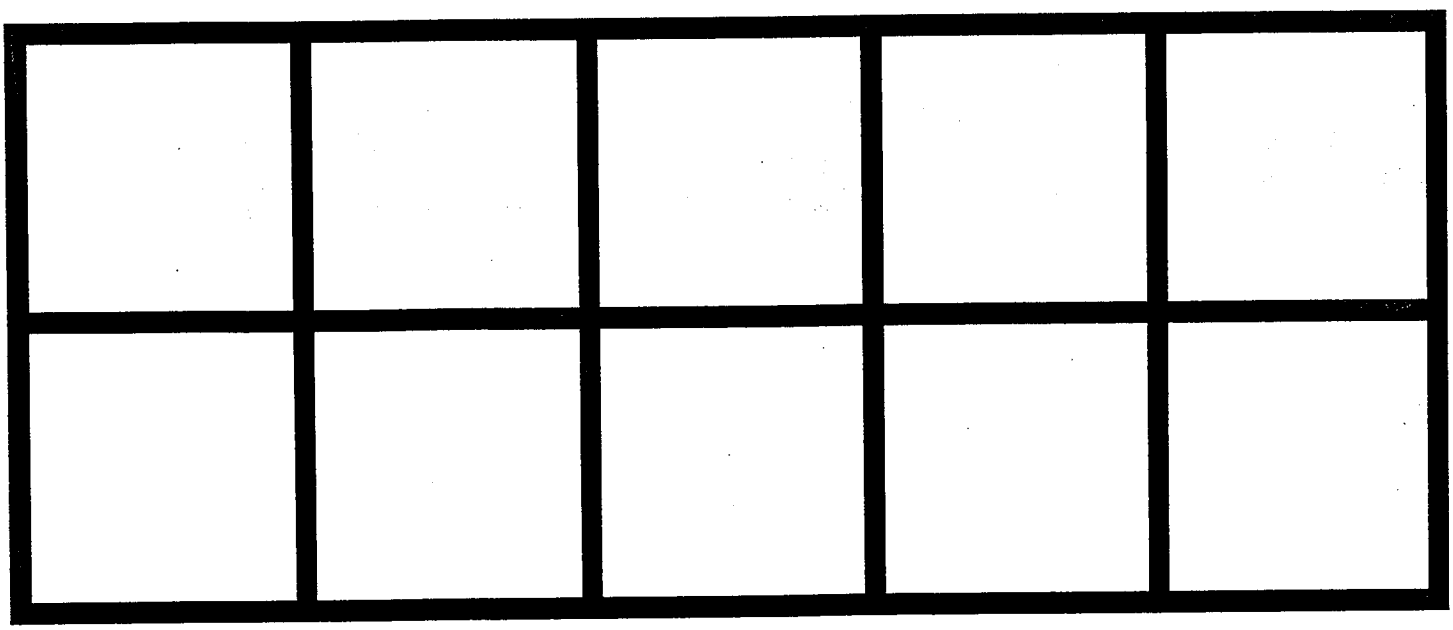










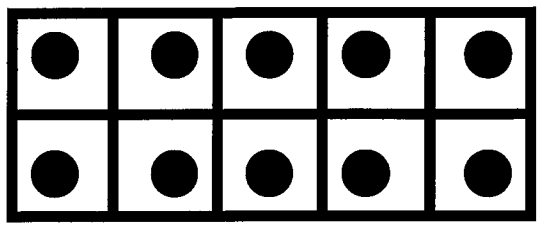


1. How many dots in the top row?
2. How many dots in the bottom row?
3. How many dots altogether?
4. How many more dots to make ten?

10 Frame

1. How many black counters?
2. How many yellow counters/
3. How many altogether?

Five-Frame/Ten-Frame Activities



Introduction

Five frames and ten frames are one of the most important models to help students anchor to 5 and 10.

Five frames are a 1x5 array and ten frames are a 2x5 array in which counters or dots can be placed to illustrate numbers.

The five frame helps students learn the combinations that make 5. The ten-frame helps students learn the combinations that make 10. Ten-frames immediately model all of the facts from 5+1 to 5+5 and the respective turnarounds. Even 5+6, 5+7 and 5+8 are quickly seen as two fives and some more when depicted with these powerful models.

For students in kindergarten or early first grade who have not yet explored a ten frame, a good idea is to anchor to five by beginning with a five frame.

Starting with Five-Frames:

Activities:

1. **Building Sets** (Materials: blank five frame mat, counters)
   Call out a number to the students, such as 4, and have them show that amount on their mat. They may place the counters in any manner. Ask if they can place the 4 counters down in a different way. Try other numbers from 0-5. Have your students make observations about their placement of counters.
   - *It has a space in the middle.*
   -It's two and two.

   Numbers greater than 5 are shown with a full five-frame and additional counters on the mat but not on the frame.

2. **Roll and Build** (Materials: five frame cards, dice)
   Students roll one die or two dice and build that amount on their five frame mat.

3. **Memory** (Materials: two sets of five frame cards)
   Place the five frame cards face down in an array. Students take turns turning over two cards. They identify the amount on each card. If they are the same they take both cards. Play goes to the next players.

4. **Challenge** (Materials: two sets of five frame cards in 2 colours)
   Each student gets 1 set of cards. Each student turns over the top card of their pile and identifies the amount. The student with the greater amount takes both cards.

5. **Five Frame Flash** (Materials: large five frame cards)
   Flash a five frame card to your students and ask them to identify how many dots they saw. To challenge students ask them to identify one more or one less than the amount of dots. To extend, have them tell you how many empty spaces there are or how many more are needed to make 5.

6. **Five Frame Trains** (Materials: at least two sets of five frame cards)
   Students sequence a random set of five frame cards in order from 1 to 5 and then back to 1, etc. Students practice counting forwards and backwards out loud. Extend by turning over one card in the train and have students identify which number was turned over.

7. **Make 5** (Materials: two sets of five frame cards)
   Place the cards face up in an array. Students try to find two cards that together total 5. To challenge students turn the cards face down.

8. **Dice Match** (Materials: die, five frame cards)
   Roll the die and have students find the five frame card that has the same amount. If they roll a 6, they roll again.

Starting with Ten Frames:

Activities:

1. **Building Sets** (Materials: blank ten frame mats, double ten frame mats, counters)
   Call out a number from 1-10 and have students build that amount on their ten frame. Students fill the first row first. Call out a different number and have students build the new number. Observe to see which students can simply add or remove counters and those that must begin from 1. Continue with different amounts. Extend to a double ten frame building numbers to 20.

2. **Roll and Build** (Materials: ten frame cards, dice)
   Students roll two dice and build that amount on their ten frame mat.

3. **Memory** (Materials: two sets of ten frame cards)
   Place the ten frame cards face down in an array. Students take turns turning over two cards. They identify the amount on each card. If they are the same they take both cards.

4. **Challenge** (Materials: two sets of ten frame cards in 2 colours)
   Each student gets 1 set of cards. Each student turns over the top card of their pile and identifies the amount. The student with the greater amount takes both cards.

5. **Ten Frame Flash** (Materials: large ten frame cards)
   Flash a ten frame card to your students and ask them to identify how many dots they saw. To challenge students ask them to identify one more or one less than the amount of dots. To extend, have them tell you how many empty spaces there are or how many more are needed to make 10.

6. **Ten Frame Trains** (Materials: at least two sets of ten frame cards)
   Students sequence a random set of ten frame cards in order from 1 to 10 and then back to 1, etc. Students practice counting forwards and backwards out loud. Extend by turning over one card in the train and having students identify which number was turned over.

7. **Make 10** (Materials: two sets of ten frame cards)
   Place the cards face up in an array. Students try to find two cards that together total 10. To challenge students turn the cards face down.

8. **Dice Match** (Materials: dice and ten frame cards)
   Roll the dice and have students find the ten frame card that has the same amount. If they roll 11 or 12, they roll again.

9. **What's the Difference?** (Materials: at least three sets of ten frames, 50 counters)
   5 cards are spread out face down and the rest are placed in a pile face down. The students take turns turning over the top card in the pile as well as one of the spread cards. They then determine the difference between the two cards and take that amount of counter. The card that was turned over from the spread pile is flipped over again. Play continues until all of the cards from the pile have been used. The player with the most counters wins. Observe to see what strategies students are using to find the difference and to get the most counters.

10. **Ten Frame Difference Challenge** (Materials: two sets of ten frame cards in 2 colours, 50 counters)
    Students play the game like the traditional "War" game. Each student turns over the top card from their pile. Each identifies their amount. The student with the largest takes as many counters from the pile as the difference between the two cards. Play continues until all the counters are gone. The winner is the player with the most counters.

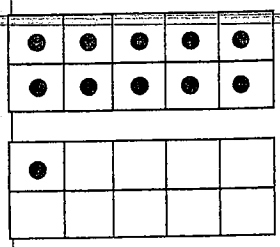
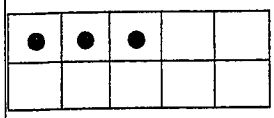
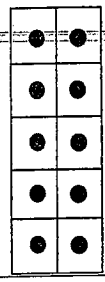
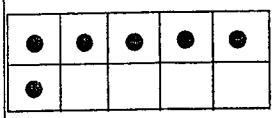
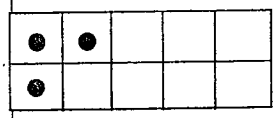
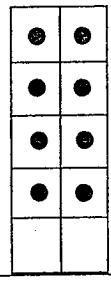
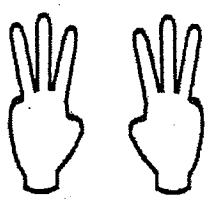
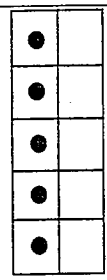
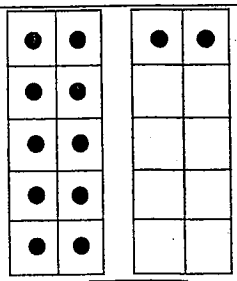
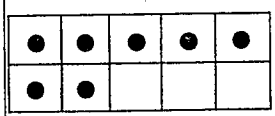
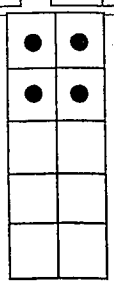
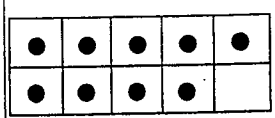
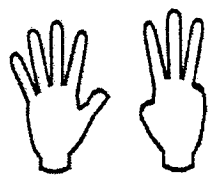
11. **Fish** (Materials: at least two sets of ten frames)
    Students play in groups of 2 to 4. Deal each player 4 cards. Spread the rest in the center like a fish pond. Students take turns asking another if they have a card with an amount that is the same as one of their cards. If they have the card they give it to the player. If they do not they draw a card from the pile. Play continues until one player gets rid of all their cards, or all the cards are matched.

12. **10 Fish** (Materials: ten frame cards)
    Play the game like "Fish" only the object of the game is to ask the other students for a card that will add to yours to make a sum of ten.

13. **Ten Plus/Nine Plus** (Materials: 2 sets of ten frames in 2 colours)
    Place one 10 ten frame card face up in the center. Place the other cards in a pile face down. Students take turns turning over the top card and adding it to "10". Play the game "Nine Plus" like ten plus only use the nine card as the card to add the other numbers to.

14. **0-20 Numeral/Ten Frame Match** (Materials: two sets of ten frame cards, 0-20 numeral cards)
    Spread the 0-20 numeral cards face up in order. Students take turns turning over two ten frame cards and finding the total. If the numeral card match is there, they take the card. The winner is the player with the most numeral cards.

DOT BINGO

10		8		
	7			12
3		FREE	4	
	2	9		6
	5		11	

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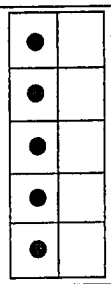
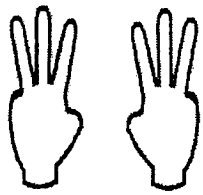
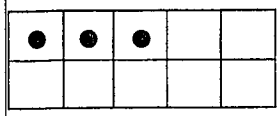
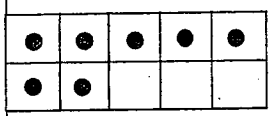
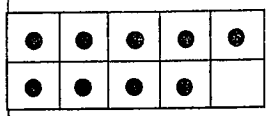
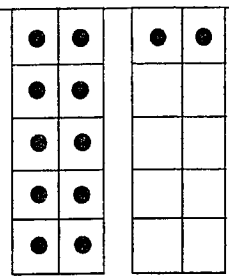
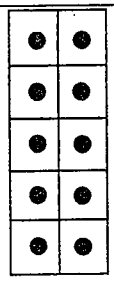
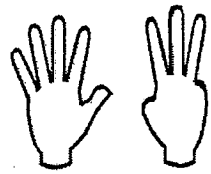
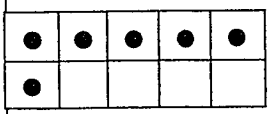
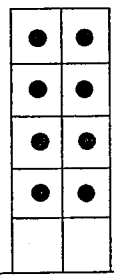
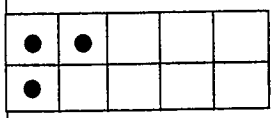
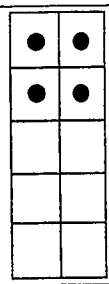
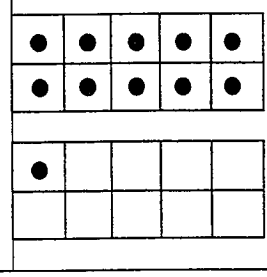
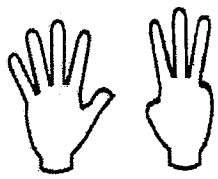
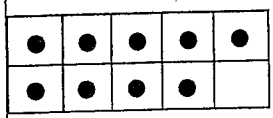
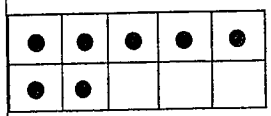
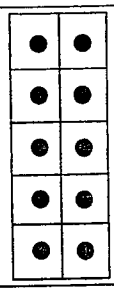
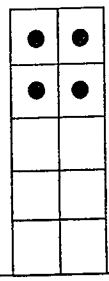
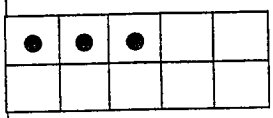
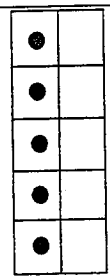
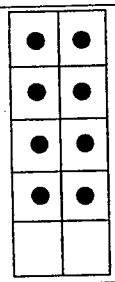
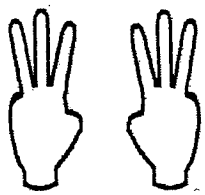
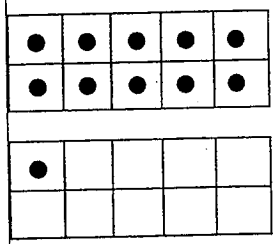
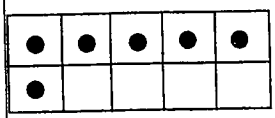
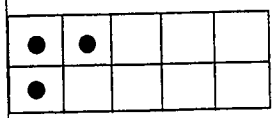
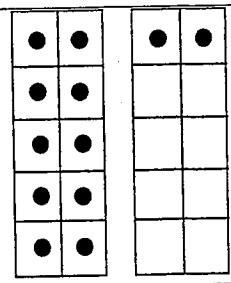
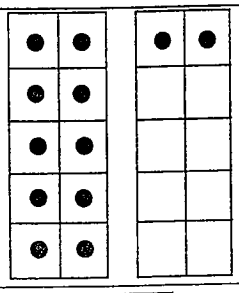
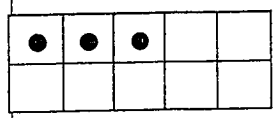
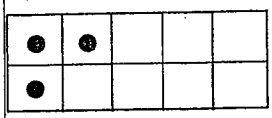
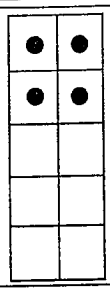
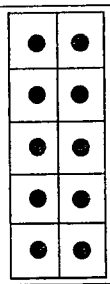
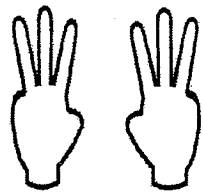
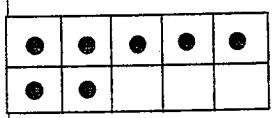
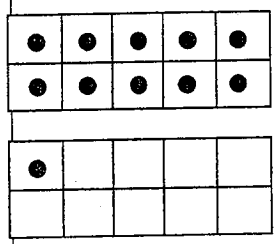
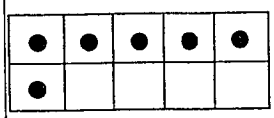
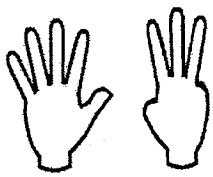
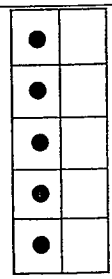
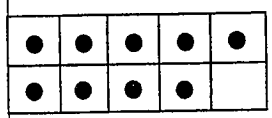
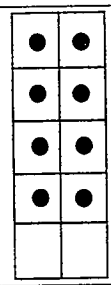
	11			9
	6		5	
12		FREE	4	
	8	2		7
3			10	

DOT BINGO

	8	2		
7	4			12
	9	FREE	6	
5				3
	10	11		

DOT BINGO

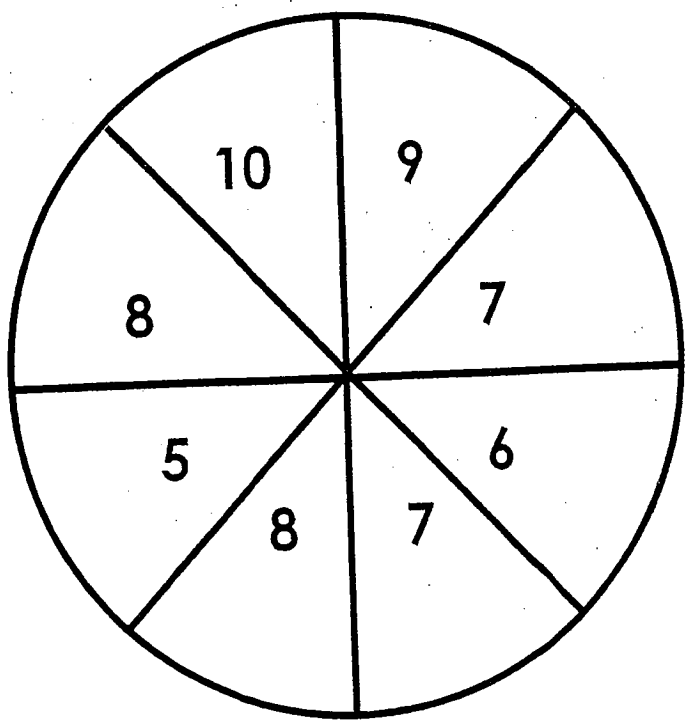
6		3		4
			12	
5		FREE		8
		7		2
9	10		11	

How many more to make 10?

2	4	0	3	1
3	5	2	4	3
4	1	0	2	5
5	4	5	1	3
0	1	3	0	2

How to play:

1. Spin the spinner. Determine how many more to make 10.
2. On each turn, place your marker on the number needed.
3. Winner is the player who gets 3 markers in a row.



Making 10

2	4	5	3	1
9	2	8	7	6
2	1	3	5	7
10	9	8	4	6
3	10	4	5	8

Making 5 Plus

7	6	8	10	9
8	9	6	7	10
10	8	9	6	7
9	7	10	8	6
6	9	8	10	7

1	6	7	2	2
9	8	3	4	4
5	7	4	9	2
6	6	7	4	5
3	8	8	3	1

7	1	2	5	4
4	2	6	8	1
7	7	6	3	2
6	8	9	5	3
5	9	3	5	8

1	2	3	4	5
0	1	6	7	6
3	2	5	6	7
4	3	4	5	8
5	6	7	8	9

Make Ten Number Find

3	8	1	9	4	5	1	7
2	3	9	2	8	5	8	2
5	7	2	1	0	1	10	9
5	3	1	6	1	9	8	7
7	4	5	2	8	10	8	2
6	2	2	5	0	2	4	5
4	3	7	1	8	10	6	8
3	8	9	10	1	3	6	7
0	9	7	1	0	5	4	9
10	2	3	7	7	5	3	2
3	4	8	2	2	1	8	1
5	7	9	9	1	8	5	6

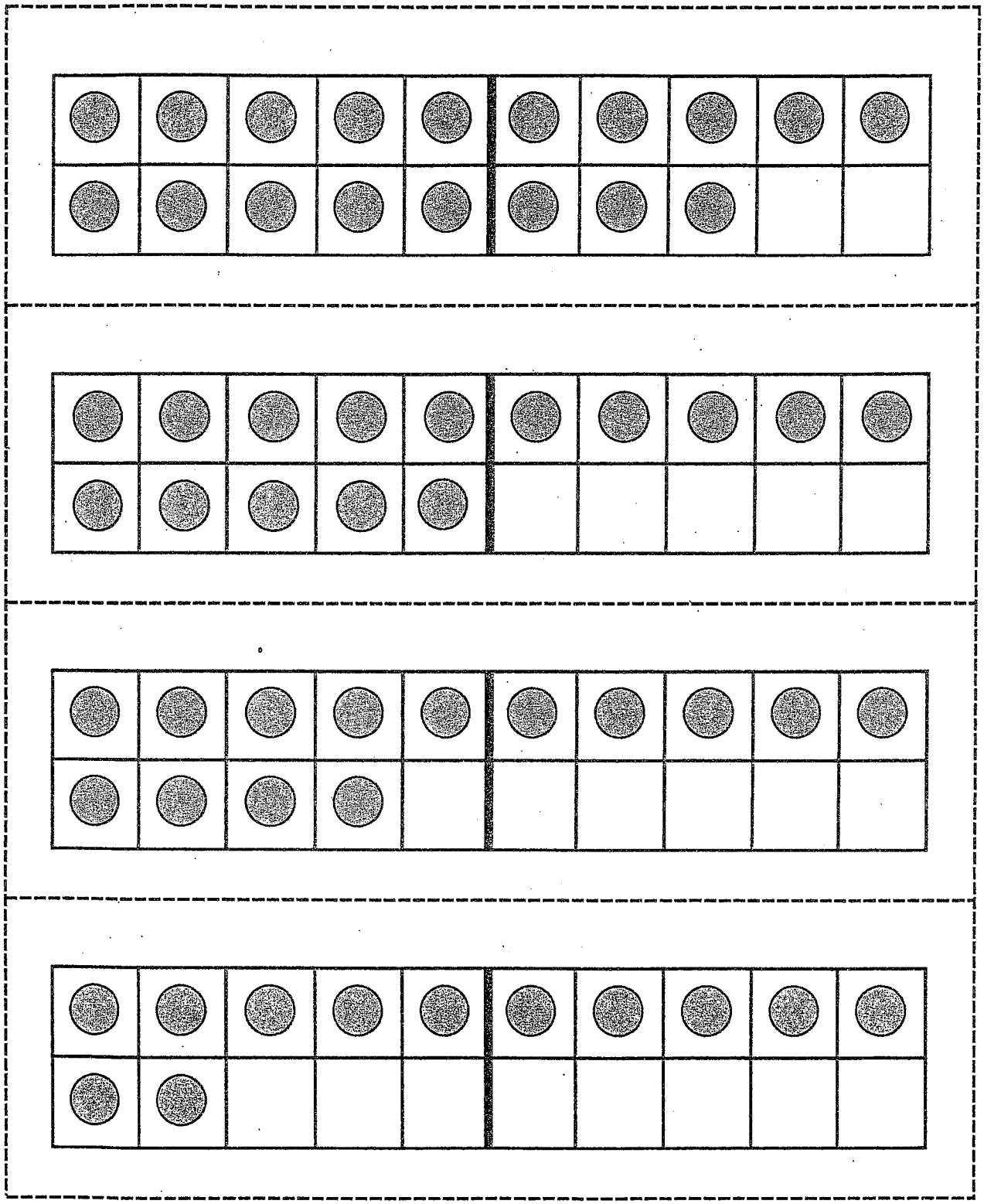
TEN FRAME FLASH

Material:	Ten-frames with dot arrangements Counters A blank ten-frame for each player
Players:	four
Rules:	The first player shows a ten-frame for a count of three, then hides it while the other players place counters in the same positions on their frames from memory. The 'flasher' shows the card again and helps each player check his/her display. After three cards the next player becomes the 'flasher' and so on, until everyone has had a turn.
Variation 1:	Points can be awarded for each correct response. The player with the most points wins.
Variation 2:	This game can be played as a whole class with one student using overhead versions of the filled ten frames to flash for the whole class
Variation 3:	A more difficult, addition game can be played by flashing two ten frames at a time and having students show the sum of the two ten frames on one ten frame (or two if the sum is greater than 10)
Variation 4:	A more difficult, subtraction game can be played by flashing two ten frames at a time and having students show the difference on one ten frame

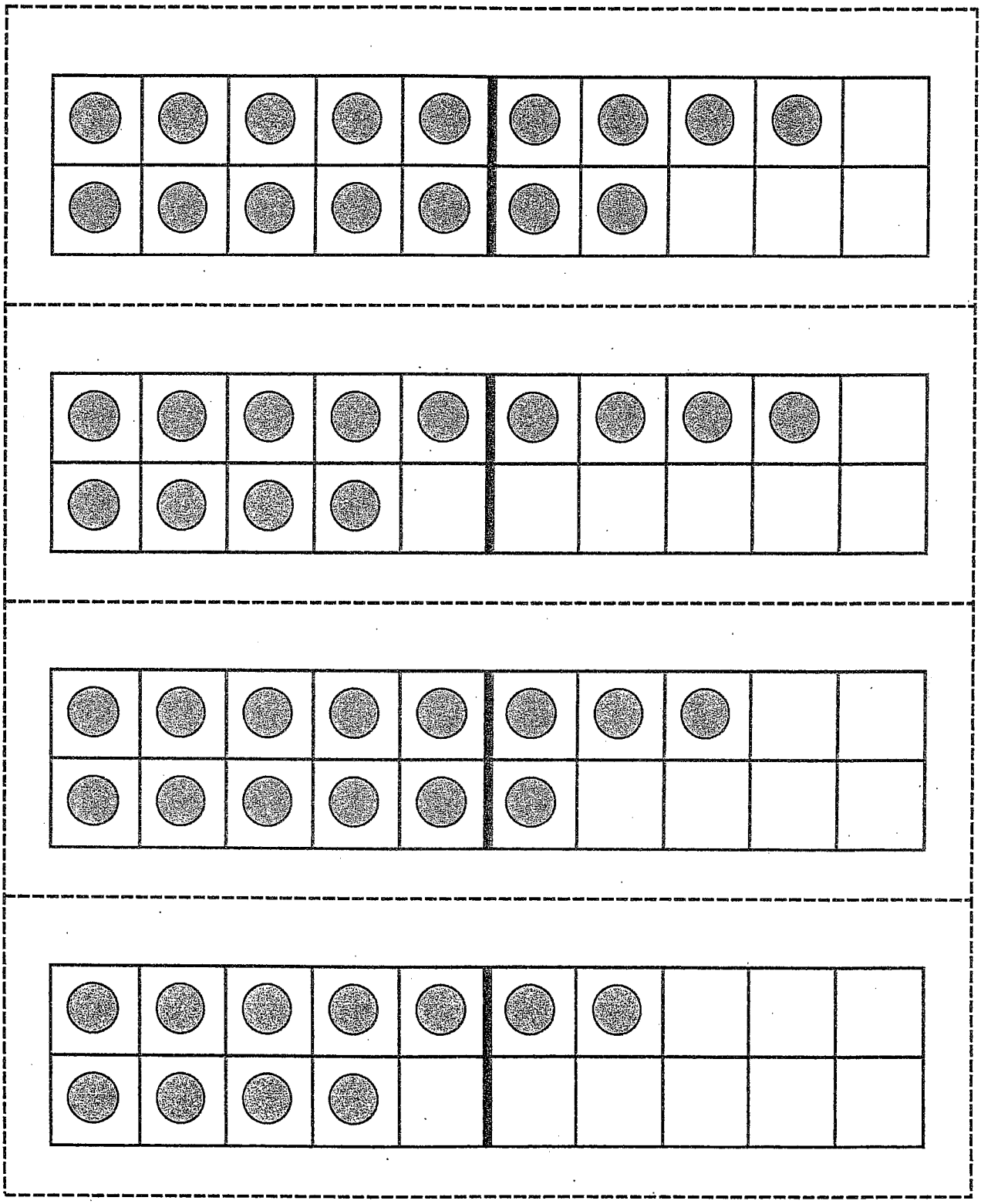
This activity was adapted from:
http://www.nrich.maths.org.uk/prime/may99/staff.htm

10 and

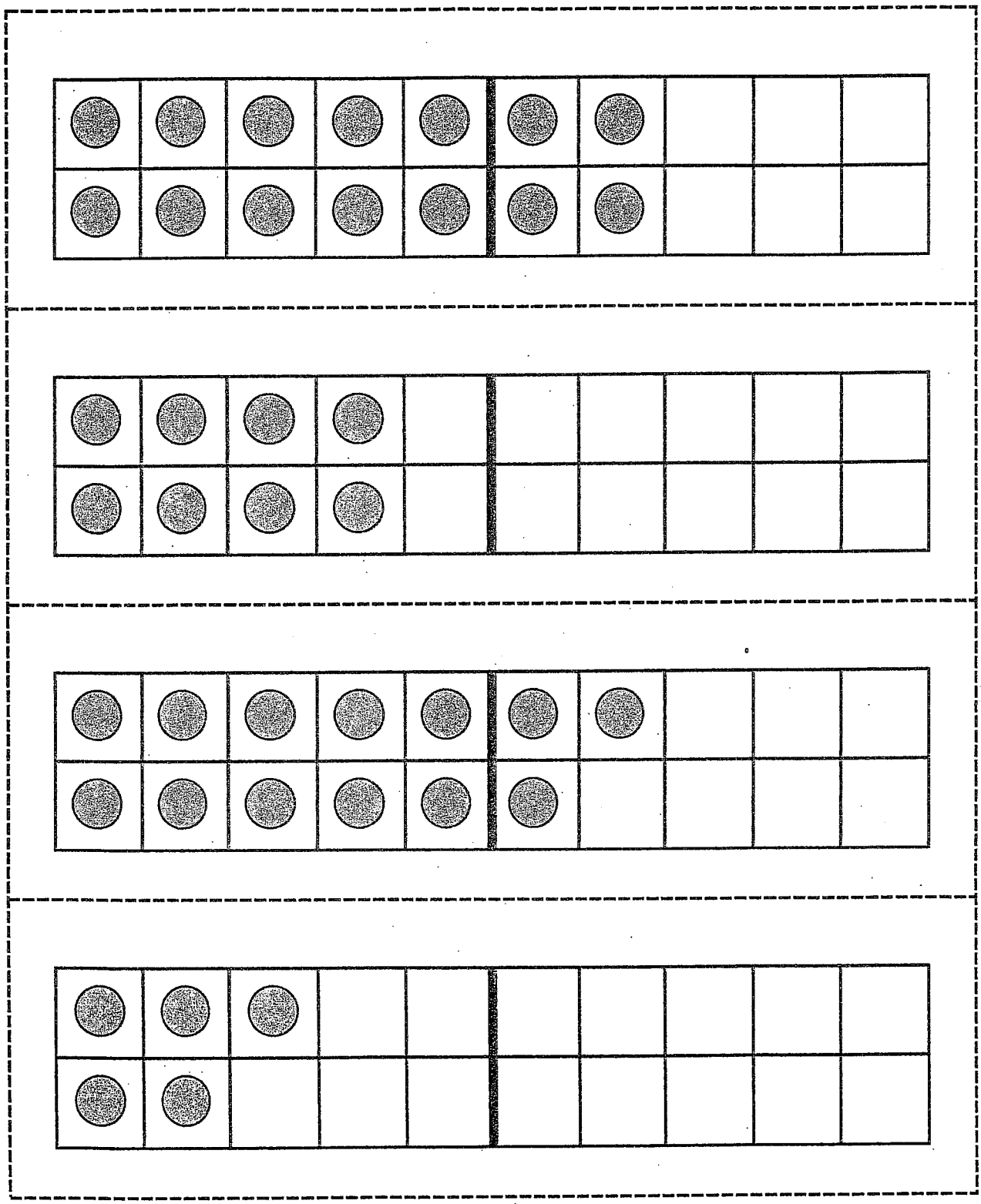
Blackline Masters for Double Ten-frame Facts



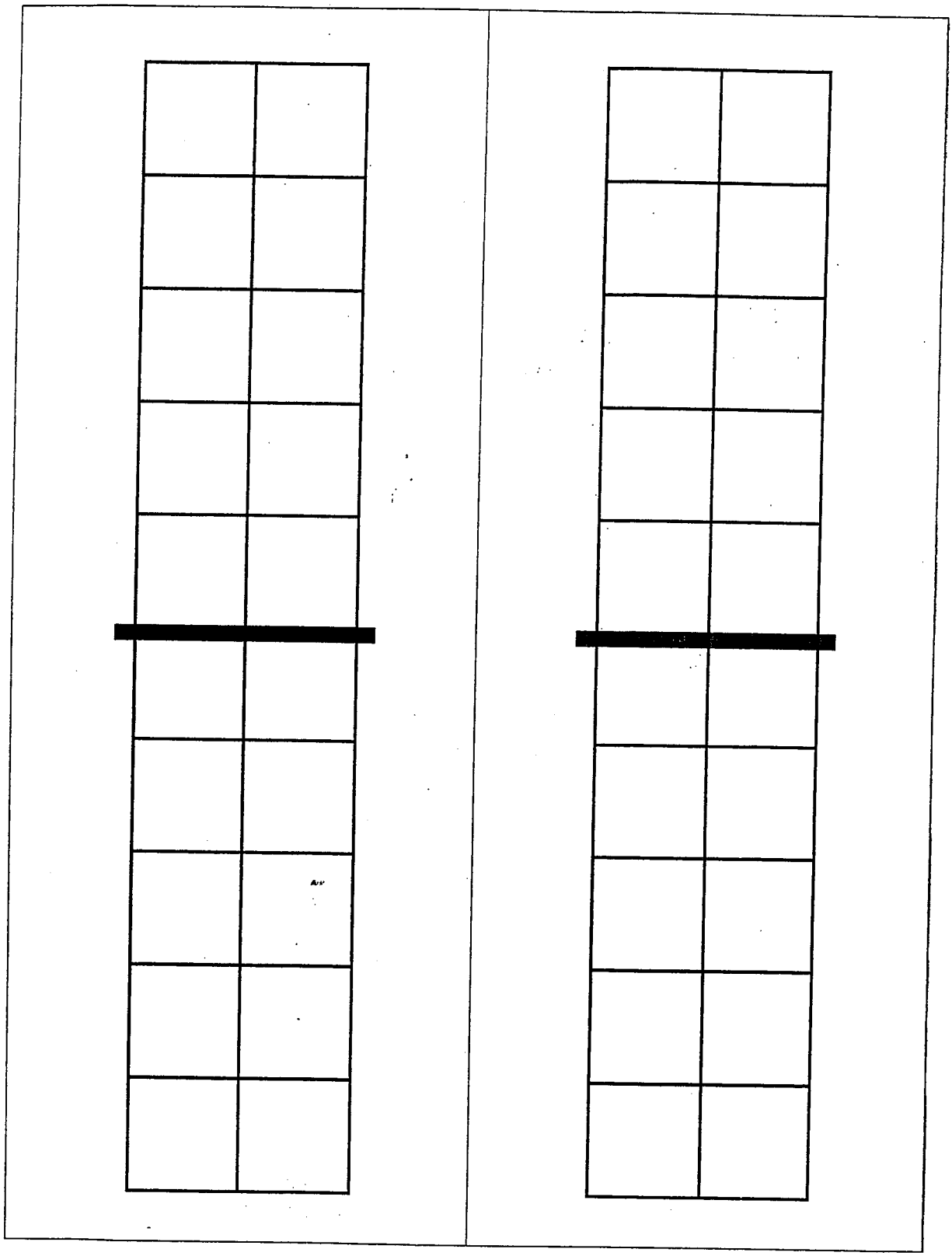
Blackline Masters for Double Ten-frames



Blackline Masters for Double Ten-frames



Double 10-Frames



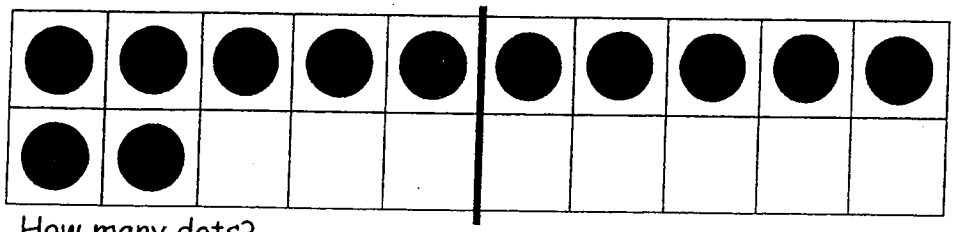
Double 10 Frame

1. How many dots in the top row?
2. How many dots in the bottom row?
3. How many dots altogether?
4. How many more dots to make 20?

LEVEL 5 – Facile Structures to Twenty

Combinations and Partitions to 20

(using reference numbers of 10, 5, and doubles)



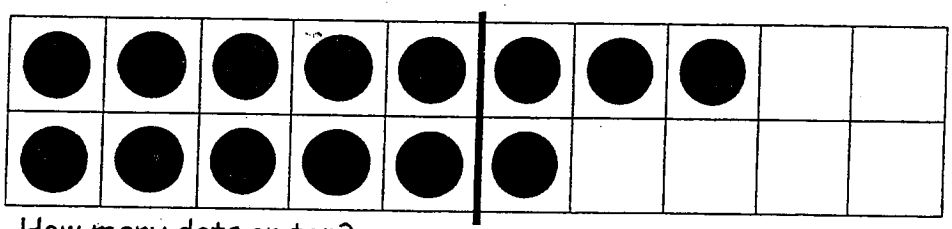
How many dots?

How many more to make 20?

(Also, tasks involving partitioning a full 20)

Note: Frames with a full 10 and those with more dots in general are typically easier than those starting with a small quantity.
Commutativity may not evident (e.g. 17 + ___ = 20 is easy, 3 + ___ = 20 is difficult)

Sample related task:



How many dots on top?

How many dots on bottom?

How many dots altogether?

Examples of possible solution strategies:

a. Compensation – If it was 10 on top it would be 16, but it is only 8, so take 2 off, it is 14
b. Transformation (10 as a reference) – take 2 from the 6 and put it with the 8 to make 10, that leaves 4, 10 and 4 is 14
c. Transformation (doubles as a reference) – take 1 from the 8 and put it with the 6, that makes 7 and 7, that's 14
d. Partitions involving five – take the 5 out of the 8 and the 5 out of the 6 to make a ten, that leaves 3 and 1, which is 4, and 10 plus 4 is 14

Other questions (with or without materials):

What goes with 14 to make 20?

What goes with 3 to make 20?

Tell me 2 numbers that make 17?

How many is 20 take away 7?

How many is 14 and 2 more?

Doubles + or – 1

3	7	11	9
1	17	1	5
15	7	5	13
3	19	9	15
11	5	17	13

How to play:

1. Spin or roll a number generator with the numbers 0-9
2. Double the number. Add or subtract 1 from your number. Place your marker on the answer.
3. Winner is the player who gets 3 counters in a row.

Subitizing

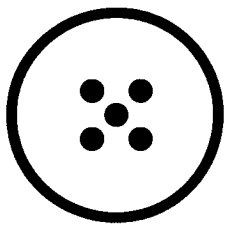
Subitizing is the ability to recognize dot arrangements in different patterns.

Since children begin to learn these patterns by repetitive counting they are closely connected to their understanding of the particular number concept. Quantities up to 10 can be known and named without the routine of counting. This can help children in counting on (from a known patterned set) or learning combinations of numbers (seeing a pattern of two known smaller patterns).

Young children should begin by learning the patterns of dots up to 6. Students should also associate the dot patterns to numbers, numerals, finger patterns, bead strings, etc. You can then extend this to patterns up to 10 when they are ready.

Subitizing is a fundamental skill in the development of number sense, supporting the development of conservation, compensation, unitizing, counting on, composing and decomposing of numbers.

For example:



We want children to learn that

- there are 5 dots in this pattern or arrangement;
- five is more than four;
- a set of 5 objects can be separated into a set of two objects and a set of three objects, etc.;
- five counters, no matter how arranged, still retains the same numerical quantity;
- the associated oral name for a set of five things is "five"

There are two types of subitizing: perceptual and conceptual.

Perceptual Subitizing:

- recognition of number pattern

Conceptual Subitizing:

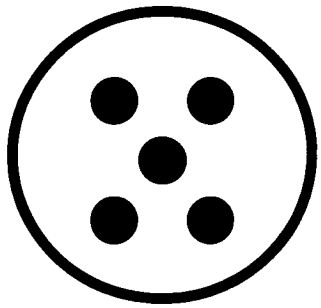
- recognition of number pattern as composite of parts and whole
- spatial (dot arrangements), temporal (attaching number to sounds), kinesthetic (finger patterns), rhythmic (hand-clapping)
- spatial arrangements of sets influences how difficult they are to subitize (rectangular easiest → linear → circular → scrambled most difficult)
- different arrangements lead to different decompositions of that number

Oral Numbers: Generally, students are ready to use oral numbers if they know that a set does not alter the number of objects in the set.

Numerals: Generally, the use of numerals with dot patterns should occur after children have made solid connections between the oral names for numbers and sets.

For more information, please refer to *John A. Van De Walle, Elementary and Middle School Mathematics: Teaching Developmentally.*

Dot Card Activities



Activities:

1. **Counter Match** (Materials: dot plates or dot cards, paper plates, counters)
   Students place one counter on top of each dot (dot plate or card). They compare the number of counters to the number of dots. Students dump counters onto an empty plate and compare the number of counters to the number of dots on the dot plate.

2. **Double Counter Match** (Materials: dot plates, paper plates, variety of counters)
   Place two empty plates, one on either side of a dot plate or card. Students make equivalent sets in each plate using a different type of counter. Students describe how all three plates compare.

3. **Make the Pattern** (Materials: dot cards, numeral cards, paper plates, counters)
   Hold up a dot card and have your students make the same pattern they see on their own plate using counters. Ask them how many dots they see and how they see them. To extend, place two empty plates down. Place a dot card in the center. Students build a set that is one less on one plate and one more on the other. Do the same activity by holding up numeral cards.

4. **Dot Card Flash** (Materials: dot cards, hole-punched cards, bingo chips, overhead)
   Flash a dot card then hide, or briefly display on an overhead a hole-punched card, an overhead dot card or bingo chips. Students state the number, hold up a dot card or numeral, or construct the arrangement.

5. **Dot Card Match** (Materials: dot cards)
   Students sort different arrangements of the same number. Discuss the number of dots in each group; which group has the most, least, etc.

6. **Number/Numeral Match** (Materials: dot cards)
   Teacher states a number or holds up a numeral card and students find the corresponding dot card.

7. **Which One is Out?** (Materials: dot cards)
   Students determine which card does not belong in a set where all but one represent the same number.

8. **Dot Card Trains** (Materials: dot cards)
   Students arrange a random set of dot cards in order (from 1-6 and back down). Extend to trains from 1-10.

8. **Concentration** (Materials: 2 sets of dot cards or plates)
   Place dot cards face down in a 5x4 array. Students take turns turning over two cards trying to find a match.

10. **Dot Card Challenge** (Materials: 2 sets of dot cards in 2 colours)
    Each student gets 1 set of cards. Each student turns over the top card of their pile and identifies the amount. The student with the larger number takes both cards.

11. **Addarama** (Materials: 2 sets of dot cards in 2 colours)
    Each student gets 1 set of cards. Each student turns over their top card. Both students add the two dot cards together. The first student to say the total amount out loud gets both cards. To extend, have each student turn over two cards and find the total of their cards. The student with the greatest amount takes all the cards.

12. **Finger Dot Match** (Materials: dot cards, numeral cards, finger cards)
    Teacher holds up fingers (i.e. 2) and asks students how many fingers. Students imitate and state number. Students then find a dot card with that many dots. Teacher then holds up 2 fingers and one more. Students imitate and state number. Students find a plate with 3 dots. Continue with other finger patterns to 10.

13. **Clothespin Match** (Materials: dot plates or cards, clothespins)
    Students choose a dot plate and attach the corresponding number of clothespins on the edge of the card.

14. **Popsicle Stick Match** (Materials: popsicle sticks, dot cards)
    Students match popsicle sticks with different dot arrangements on dot cards.

15. **Dice/Card Match** (Materials: dice, dot cards)
    Roll the die or dice and have students find a dot card with the same amount.

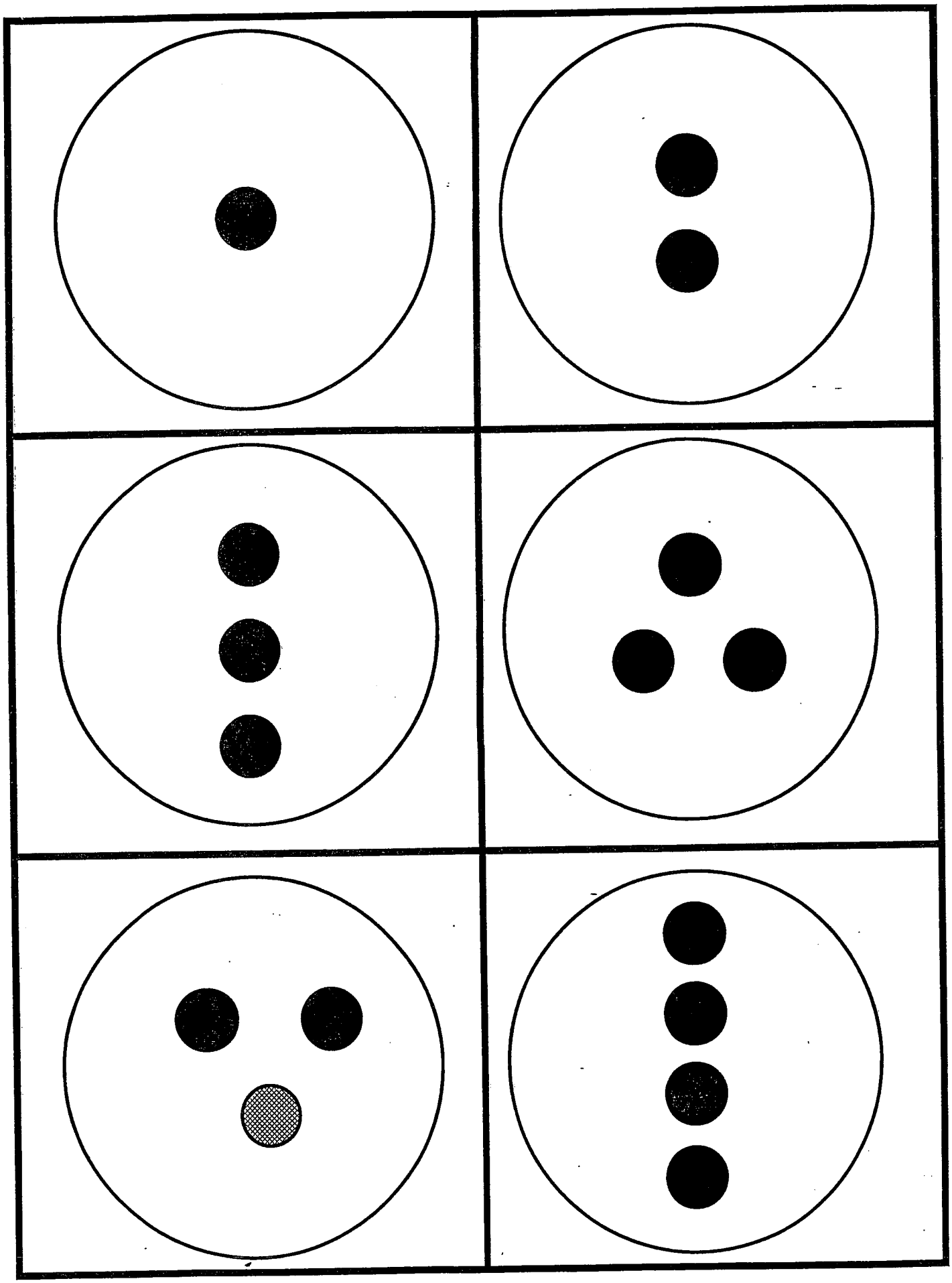
16. **Combination Target Match** (Materials: dot cards)
    Teacher holds up a dot card. Students find two plates that have as many dots as the target plate. Similarly, teacher holds up a numeral card or states a number or students choose a numeral card and find two plates that together have the total number of dots named by the numeral card. Challenge students to find more than one combination.

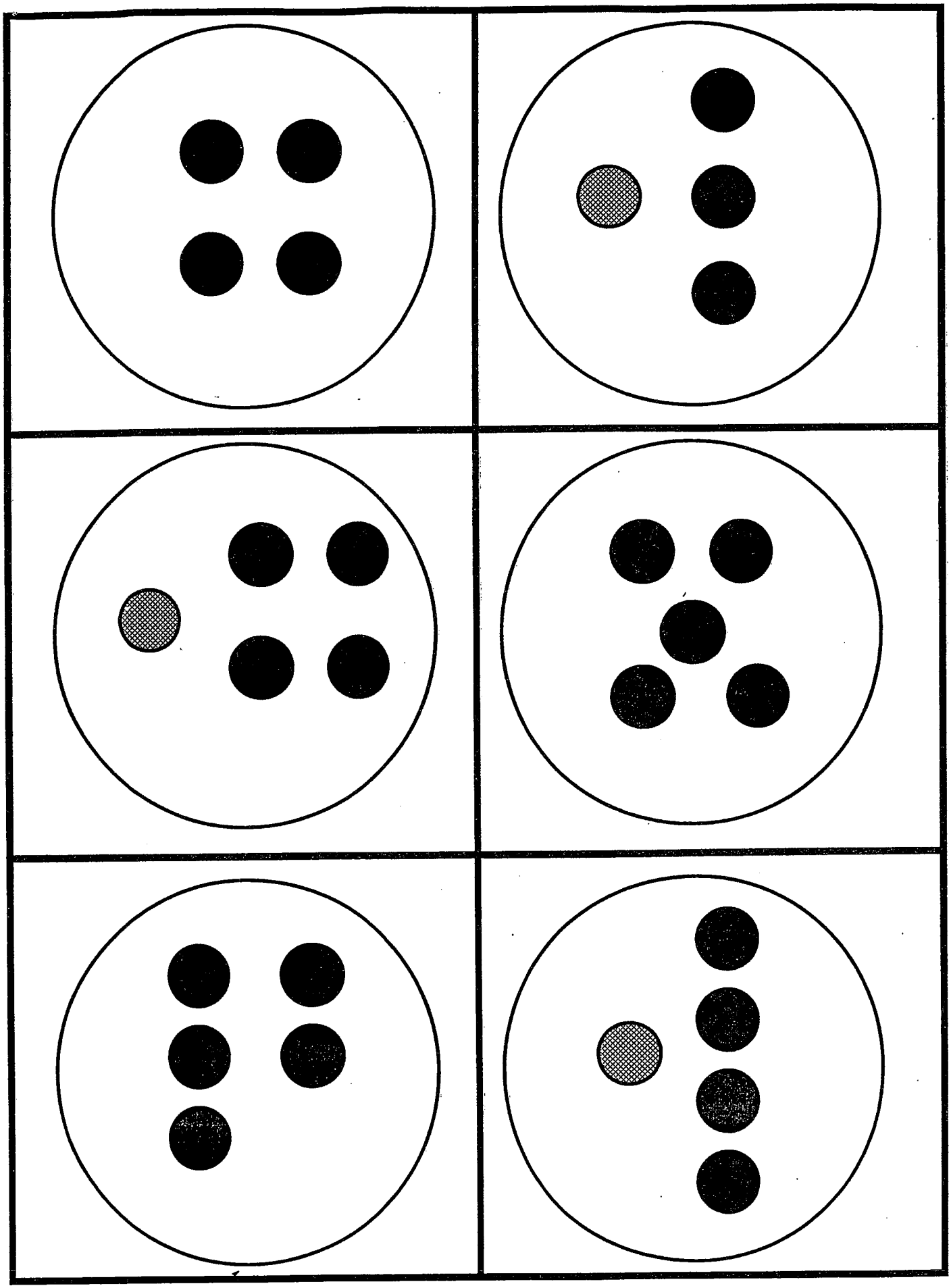
17. **Dot Card/Ten Frame Match** (Materials: dot cards, ten frames)
    Students match a dot card to a ten frame with the same amount.

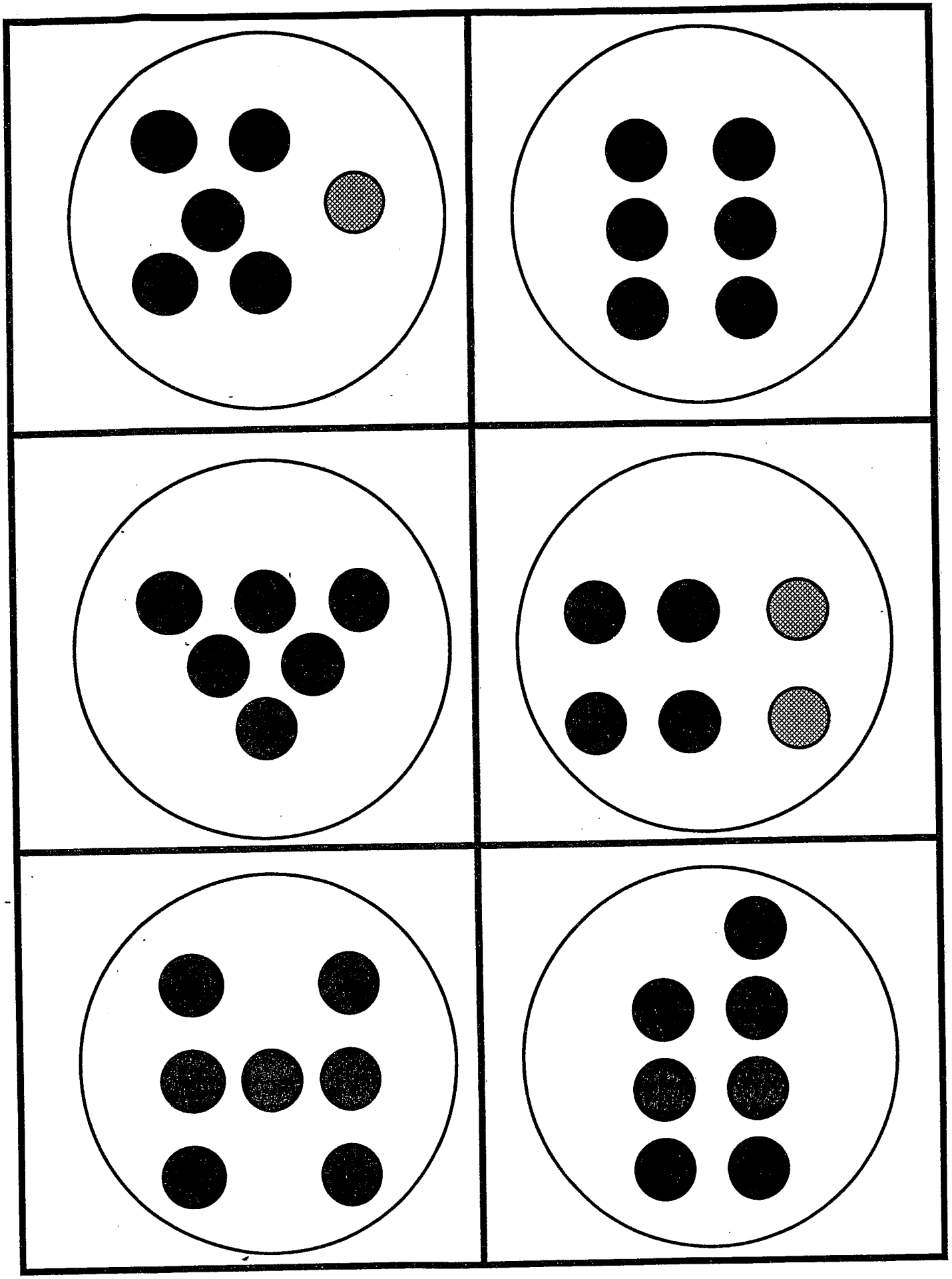
18. **Snap** (Materials: 2 sets of dot cards in 2 colours)
    Students play in pairs. Each student gets 1 set of cards. Each student flips over their top card. If they are the same amount, they say "SNAP". The student who says "SNAP" first gets both cards.

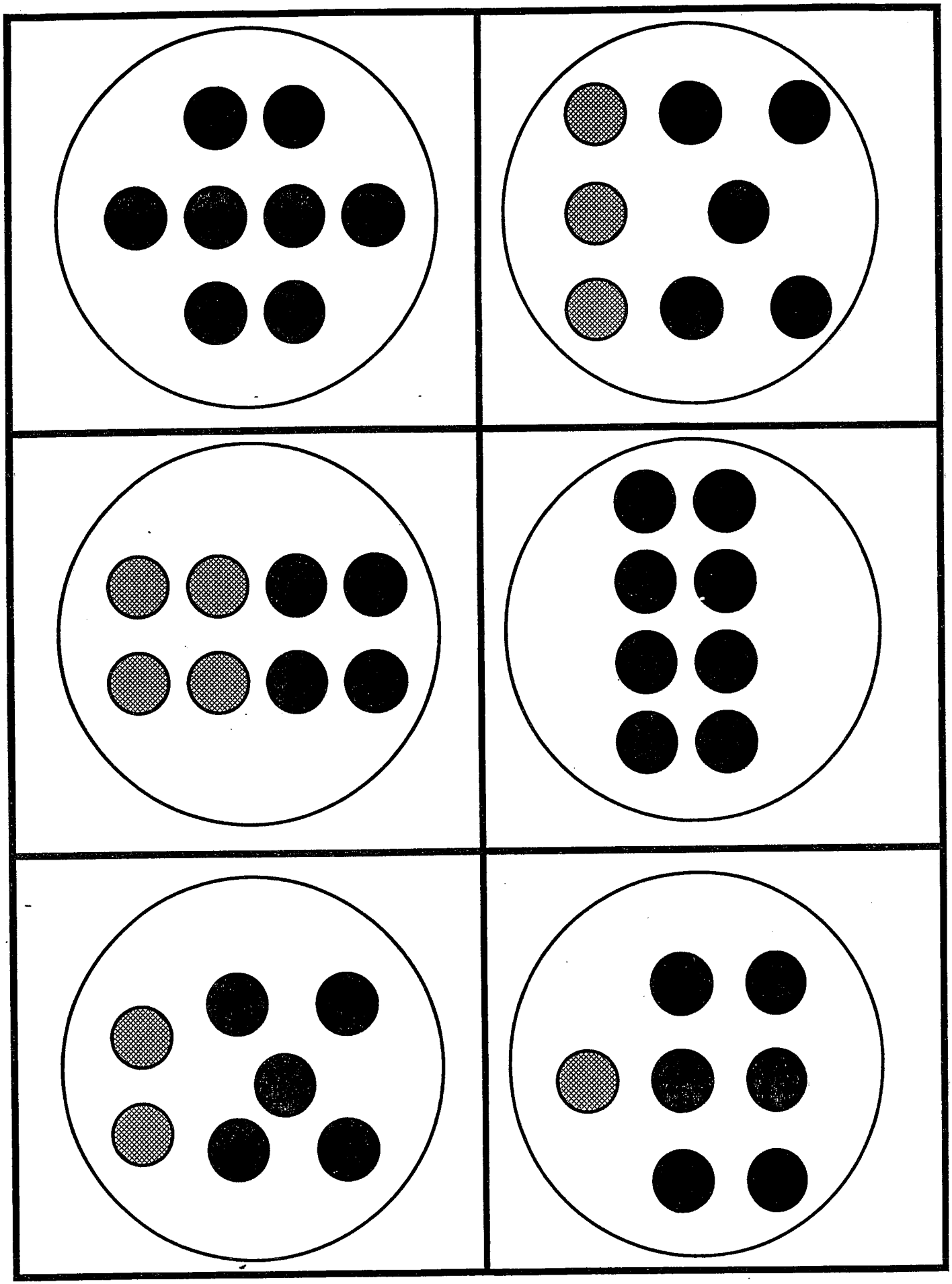
19. **I Wish I had...** (Materials: dot cards)
    Teacher holds up a dot card (i.e. 5) and says, "I wish I had 7". The student states how many more dots are required and finds the dot card (missing addend) with that amount.

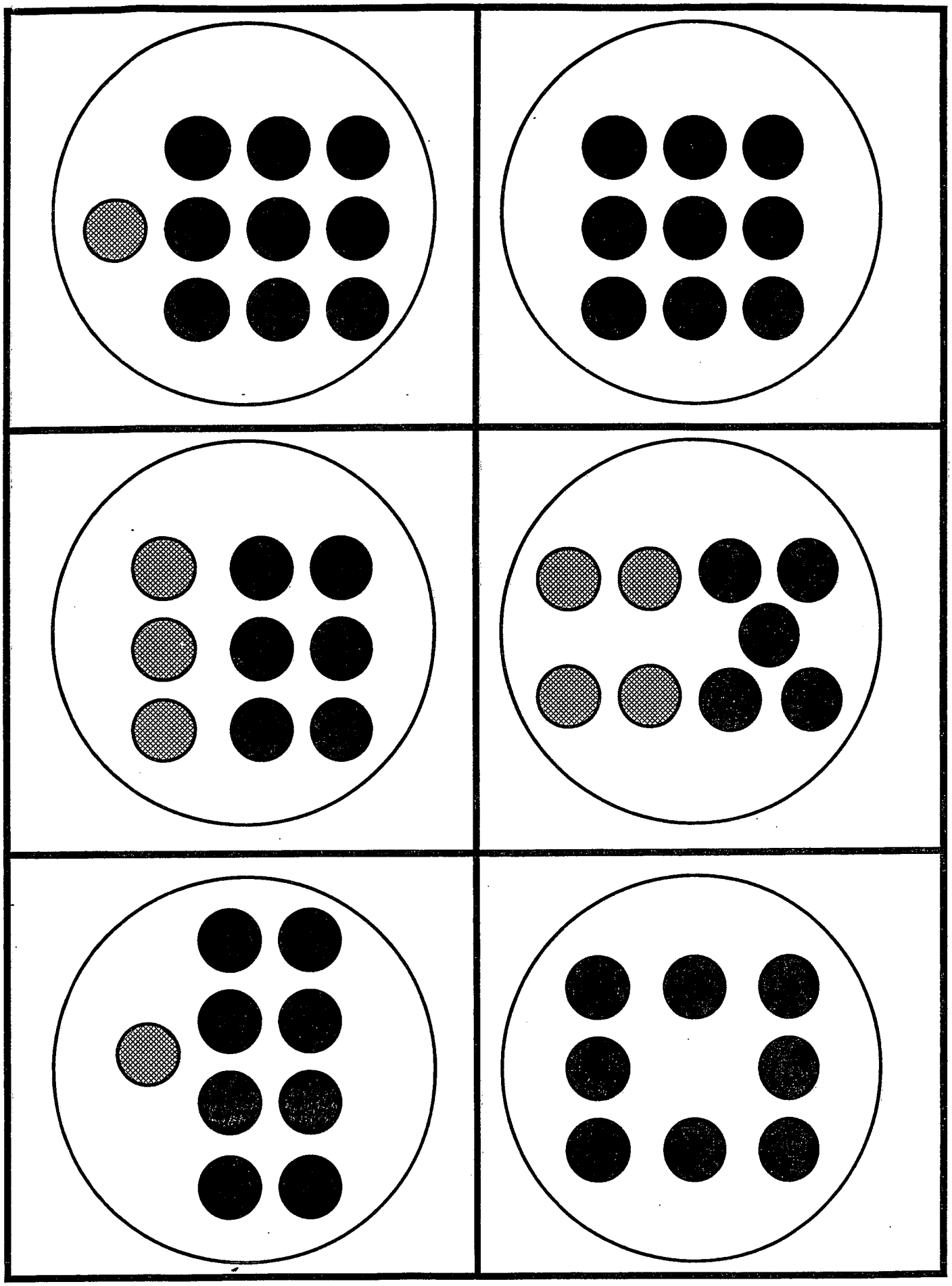
20. **Make Ten** (Materials: bingo-dabbed plates that have been marked with the regular 0 to 10 dot patterns with an extra 5 (12 plates in all))
    Place dot plates face up in an array. Students take turns removing 2 dot plates that add up to the target number "10". Challenge students by placing dot plates face down.

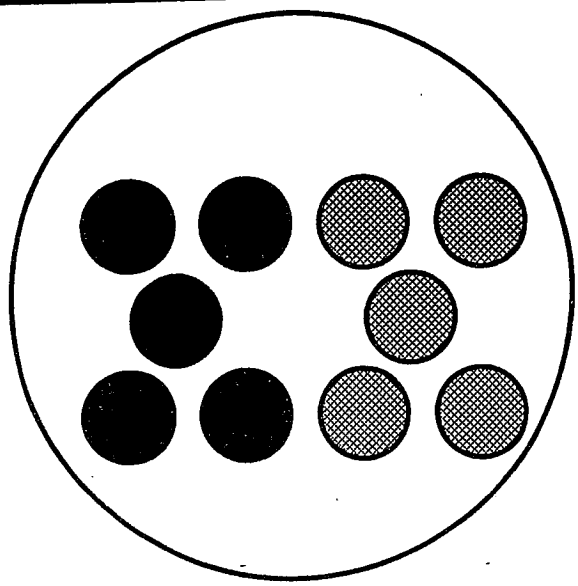


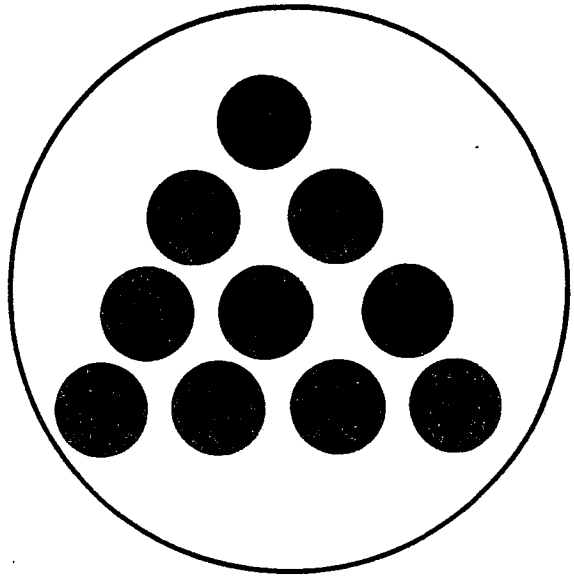










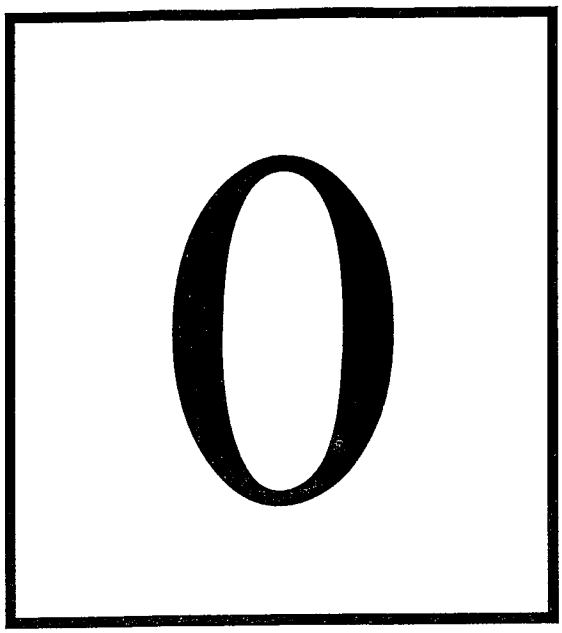


Dot cards can be used to enhance number sense.

Help students with their ability to subitize (recognition of domino and dice patterns).

Simply copy onto card stock, laminate, cut out.....and enjoy!

Source: John Van De Walle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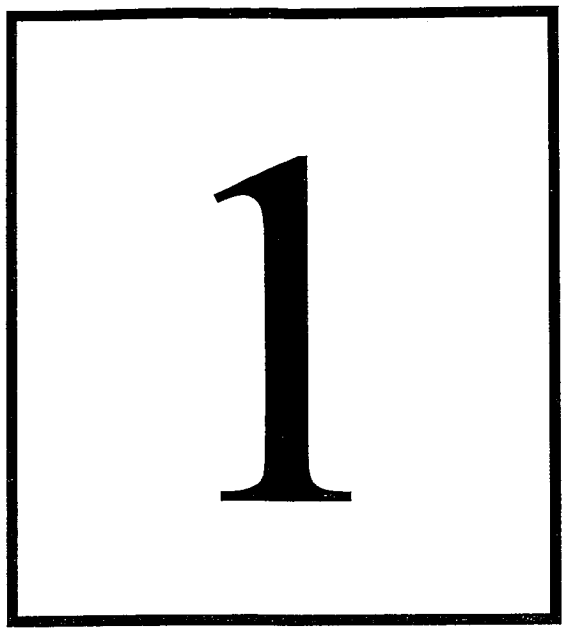
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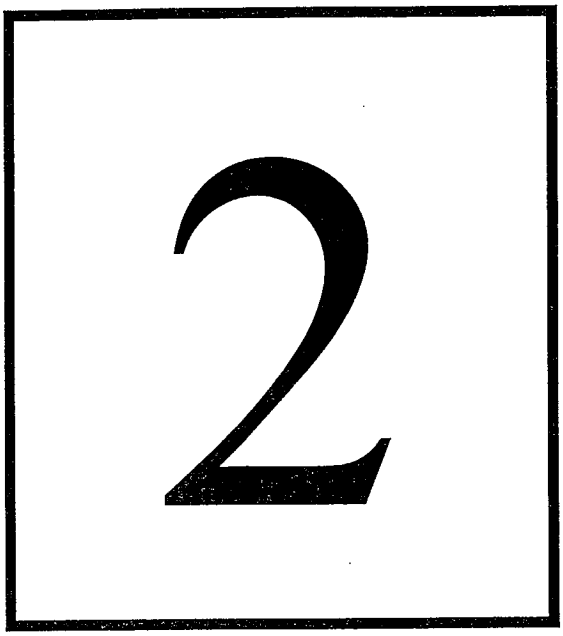
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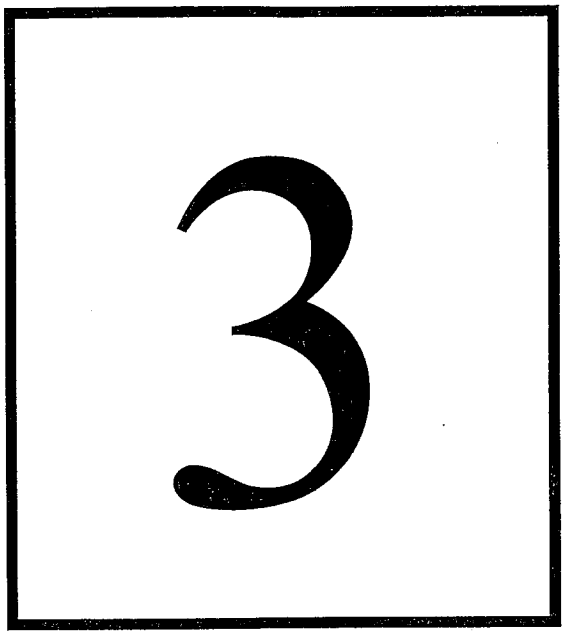
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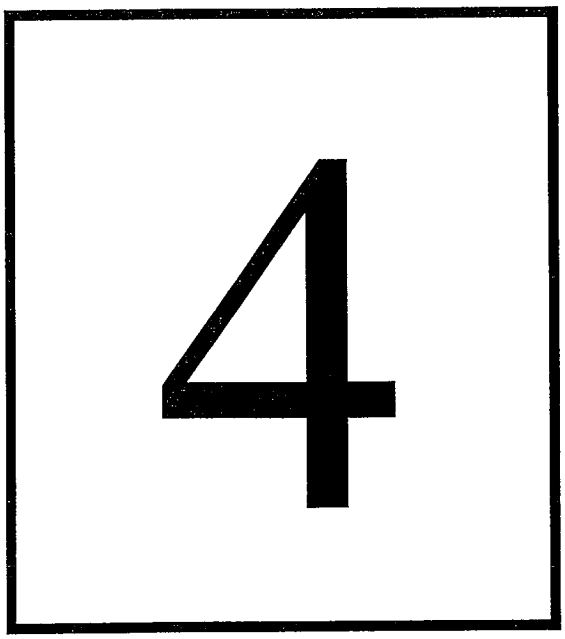
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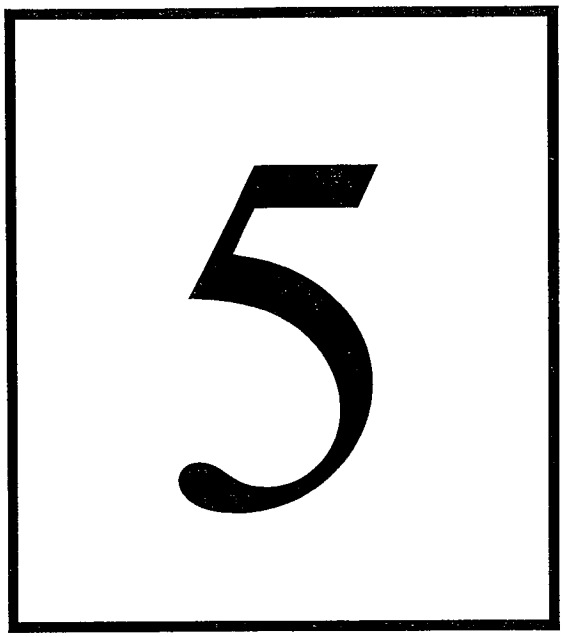
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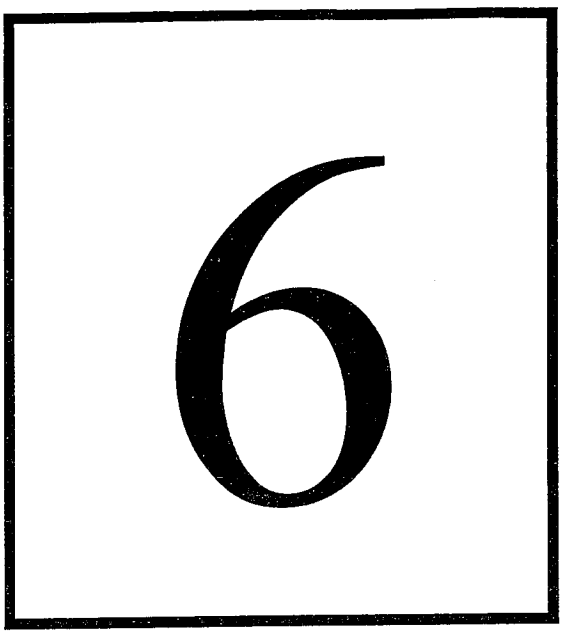
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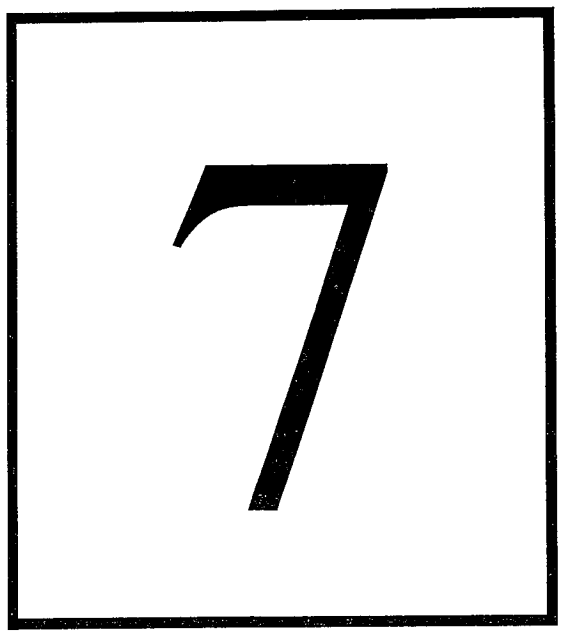
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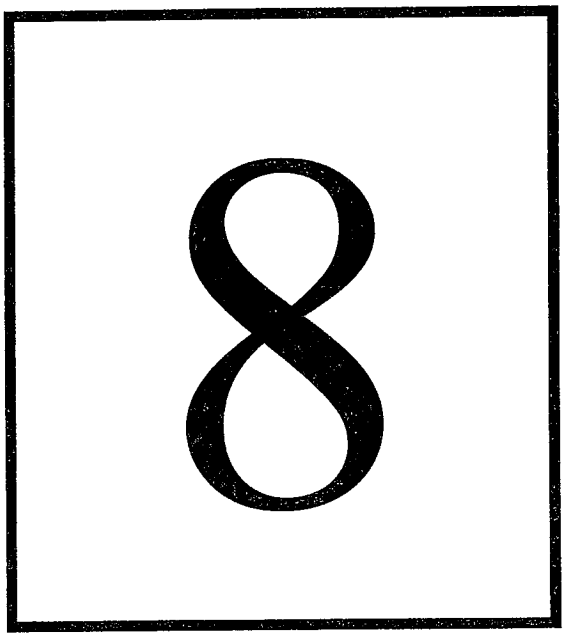
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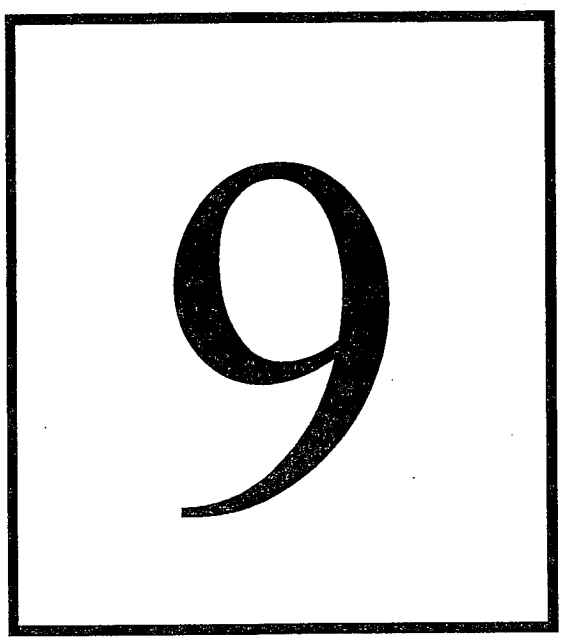
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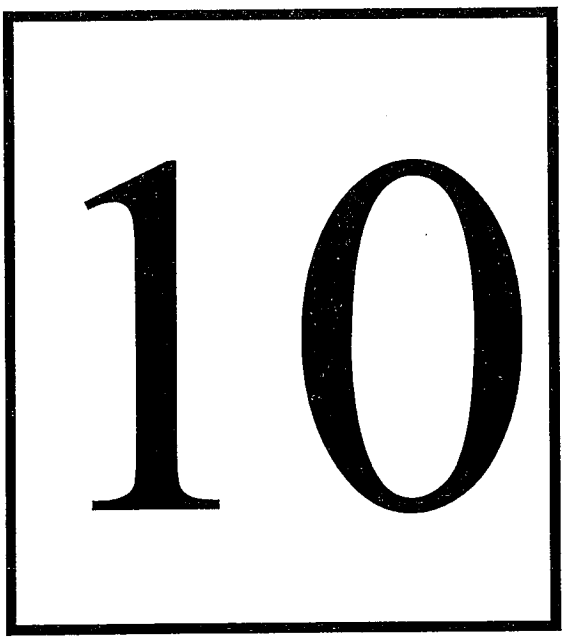
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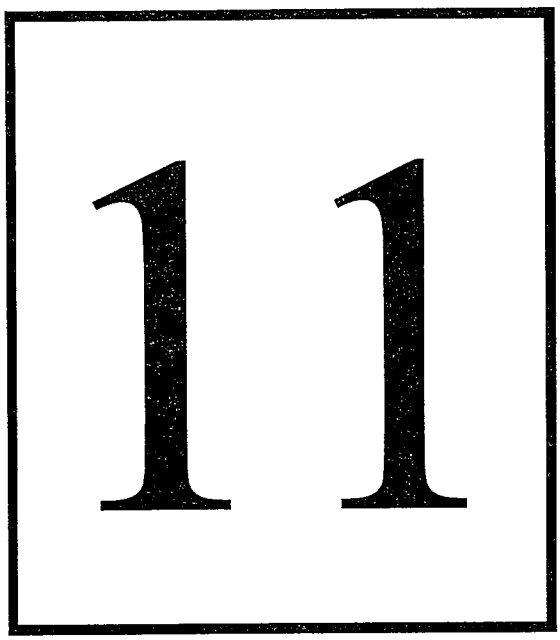
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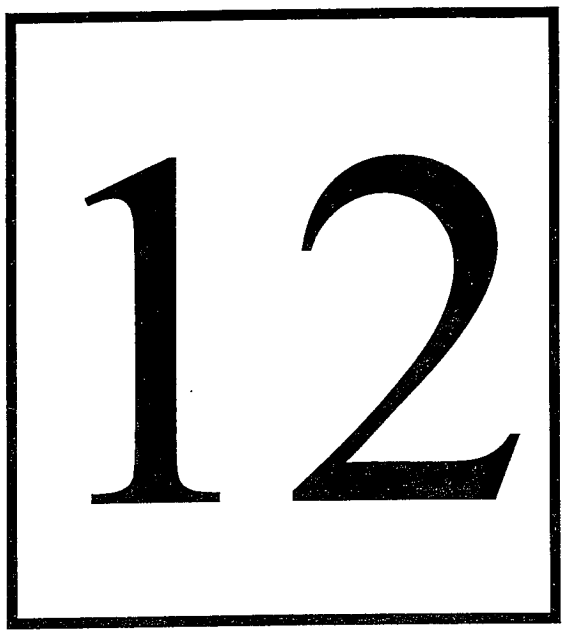
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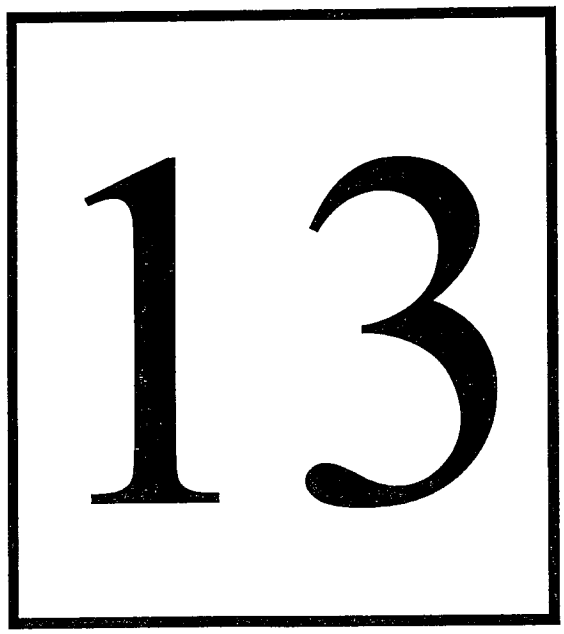
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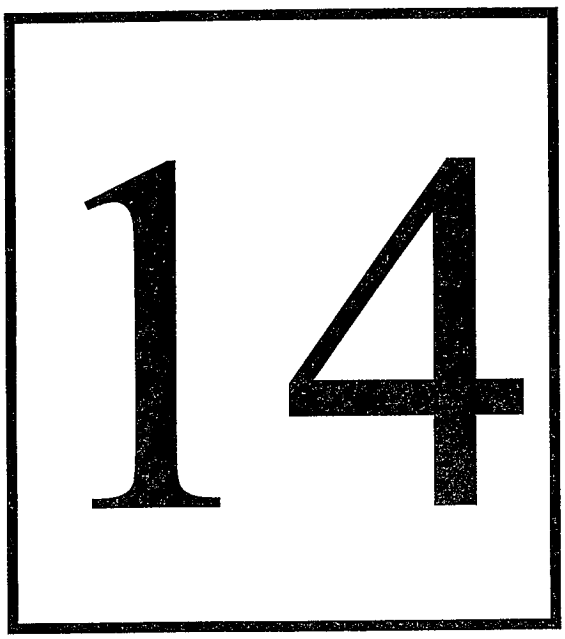
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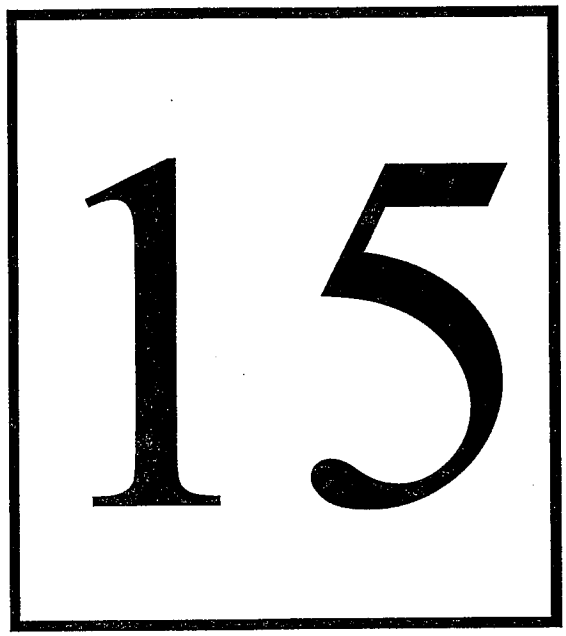
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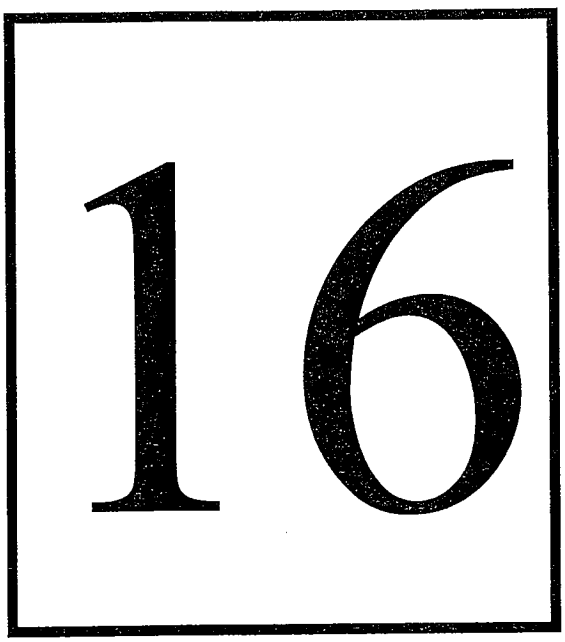
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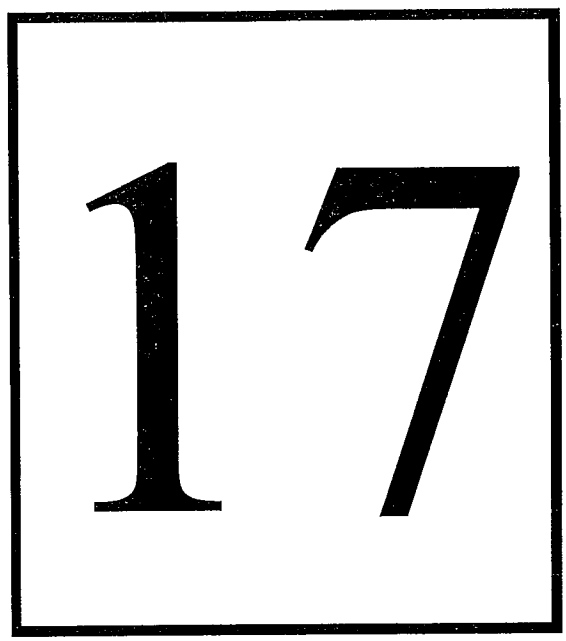
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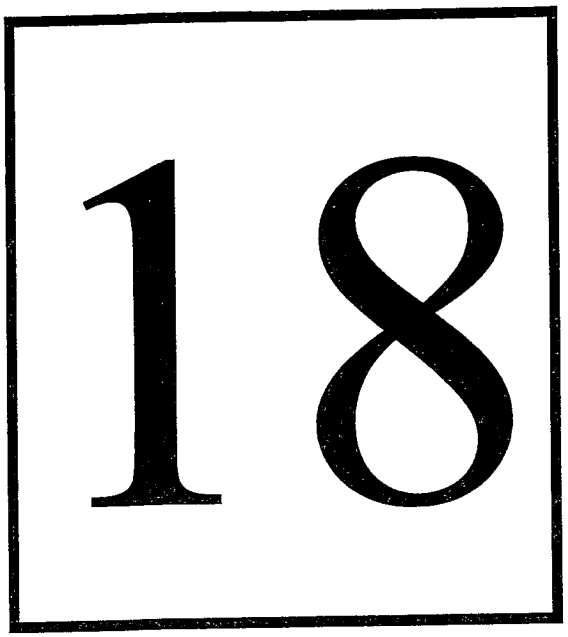
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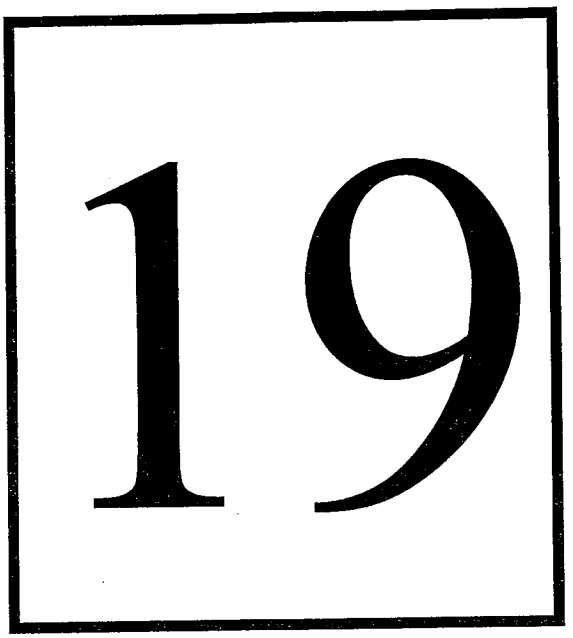
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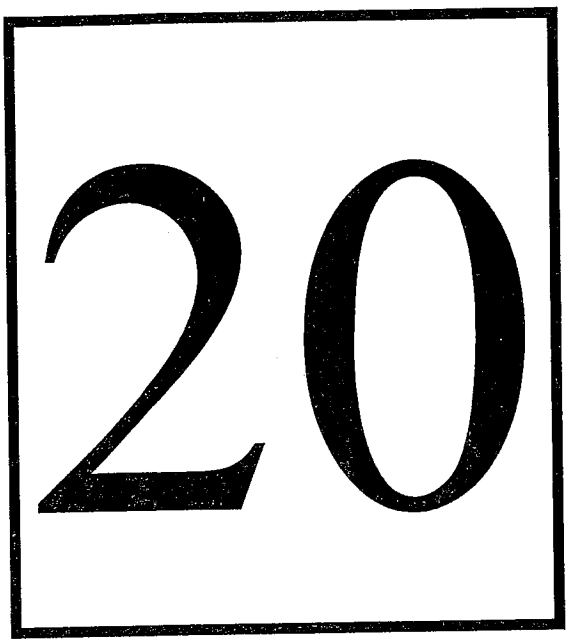
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